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McGraw-Hill Company, Inc. September 4, 1920 Twenty Cents Per Co

142

ELECTRIC RAILWAY JOURNAL

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OFFICE
Auxiliary Indicator to guide the Fireman
Recorder for Chief Engineer's Office

Meet Fuel Shortage by Stretching Fuel Supply

Eliminate unnecessary waste by burning fuel with correct air supply.

UEHLING
CO_2 METER

insures correct ratio of air to fuel continuously.

No more guesswork by the fireman nor erroneous conclusions by his chief.

New Catalog Just Issued

UEHLING INSTRUMENT CO.
2114 Empire Bldg., New York

Exhibit of New Uehling CO_2 Meter at New York Chemical Show, Sept. 20-25.

A Surprise

"I hadn't any idea, Bill," said Joe, the Superintendent, to the master mechanic, "that you were preparing this grand surprise for me and the boss. I can hardly believe that you obtained all those wrenches, jacks, bars, etc., from the sale of that old junk lying around the shop and barns.

"Yes, sir," replied Bill, "and what is more, we have enough left to order a complete equipment of Westinghouse No. 306-CV Motors and HL control, for our freight-baggage car."

"Good," said Joe, "our freight business is picking up."

Westinghouse Electric & Manufacturing Co.

Sales Offices in All Large American Cities

East Pittsburgh, Pa.

Vol. 56, *No.* 10 New York, September 4, 1920 *Pages* 445-486

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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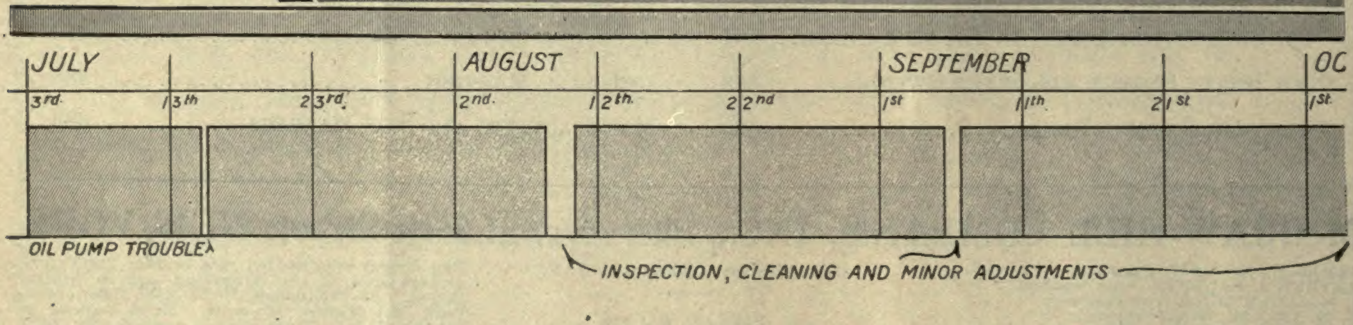
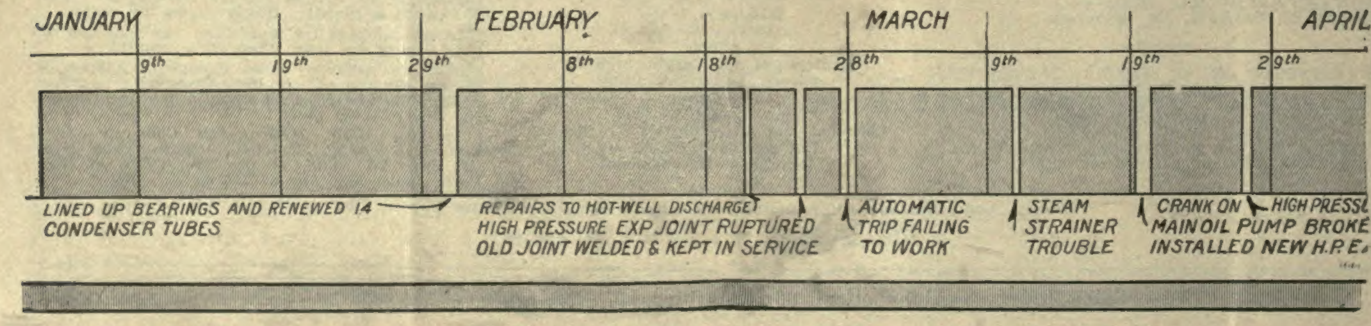
Westinghouse

45,000 Kw.

Westinghouse Steam Turbine.
Duquesne Light Co.,
Pittsburgh, Pa.





Large Turbines

A Year's Performance

We plan to publish, from time to time, records of the operation of our large turbines.

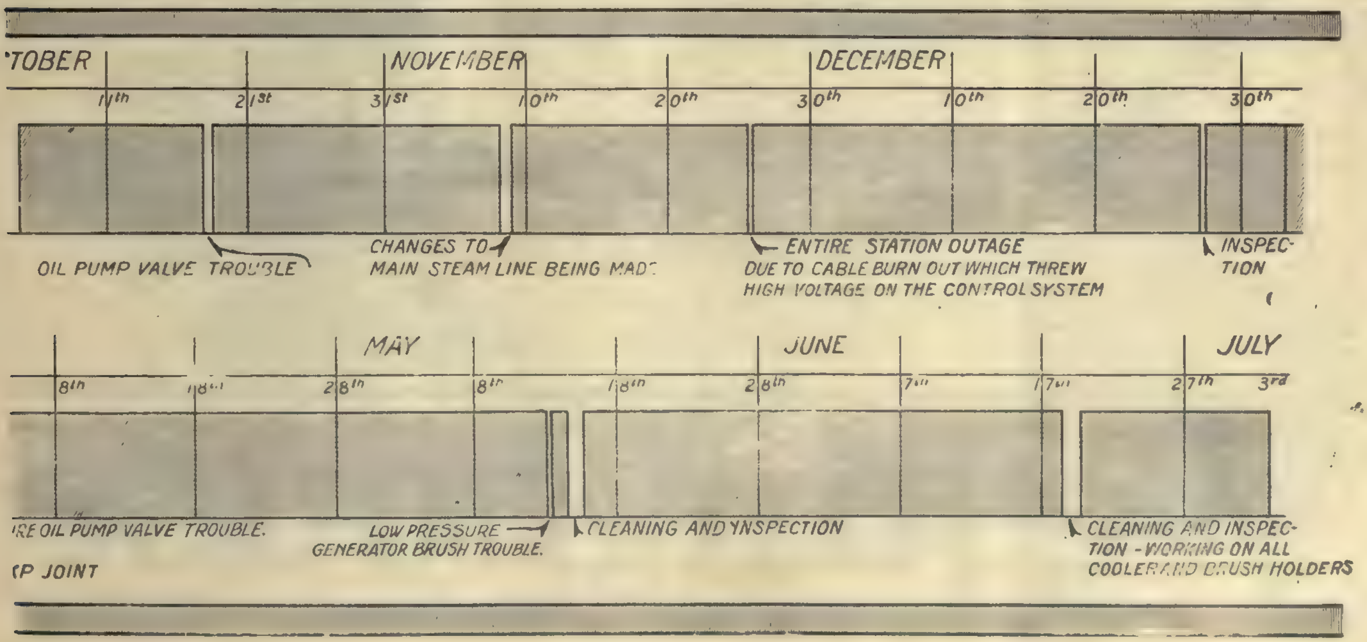
These reports will furnish what we believe to be the chief points of interest regarding large turbines—a record of their operation.

We have just received from the Duquesne Light Company, and reproduce below, a year's record of the operation of our 45,000 kw. turbine in the Brunots Island Plant.

This record shows fourteen days during the year that the turbine was not operating. Ten of these days are accounted for by the customary shut-downs for inspection—leaving four days in the year that the machine was not running due to some minor troubles which are shown on the chart.

This turbine was in service 96.2% of the time, and was available for service 99% of the time.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



High Vacuum Jet Condensers

W
WESTINGHOUSE ELECTRIC

Readily Adaptable To Changing Conditions

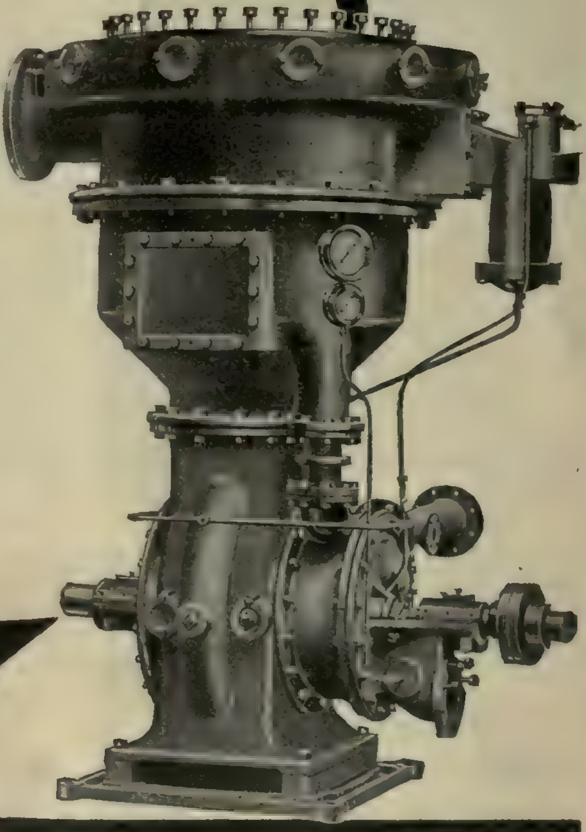
In addition to the high vacuum and guaranteed performance, there are other considerations which the condenser buyer should not overlook.

Those who have investigated, have found that Westinghouse Condenser Designs, have been developed to a point where they are readily adaptable to a wide range of variables in condenser practice.

Often the initial installation does not take into consideration conditions which may later cause a change in location of pump drives. In this respect, Westinghouse Jet Condensers are extremely flexible, provisions having been made for the easy and convenient location of the driving turbine or motor at either end of the driving shaft.

Ask our nearest district office for literature describing those considerations which we feel are of importance to the condenser buyer.

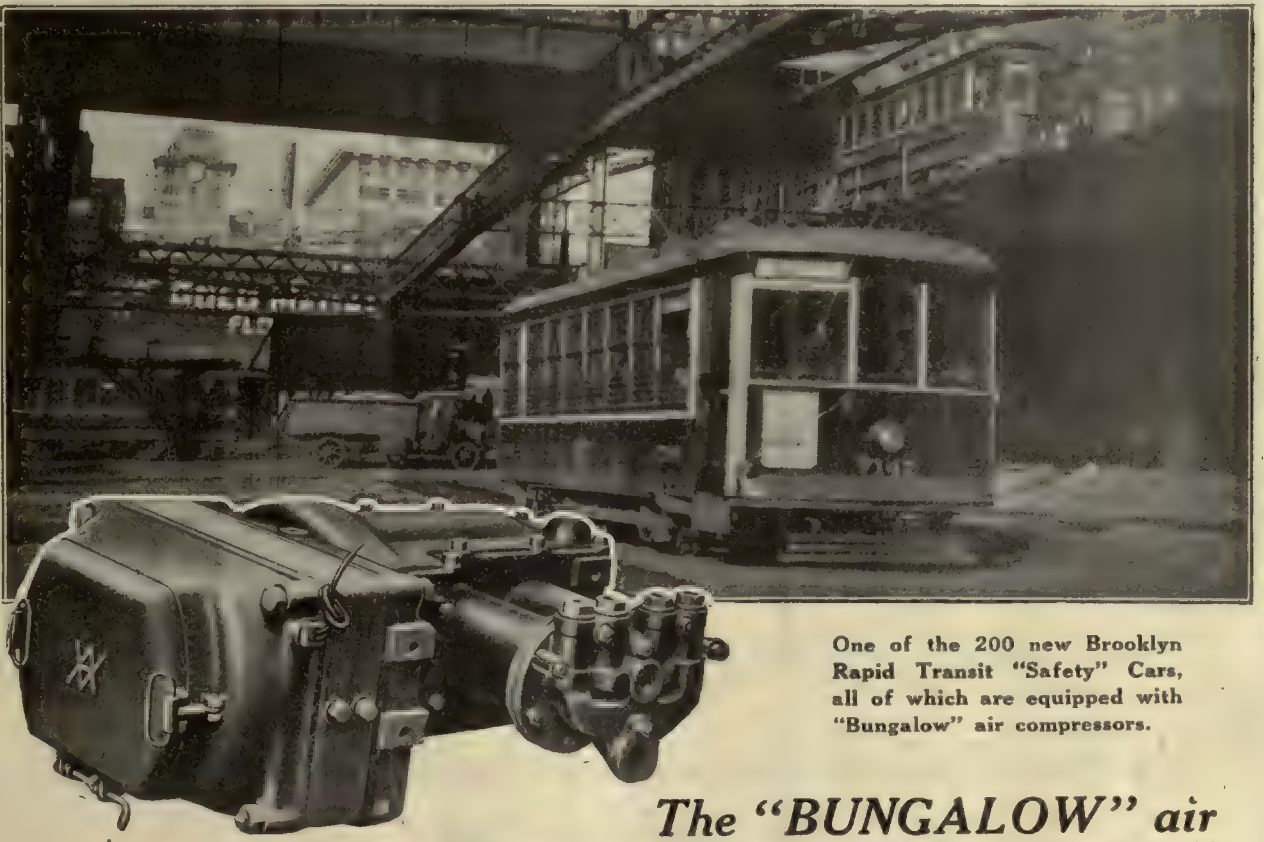
Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.
Sales Offices in All Large American Cities



The shaft extension opposite the customary turbine drive, is arranged for a coupling, so that a motor may be conveniently installed if desired.

Westinghouse

Jet, Surface and Barometric Condensers



One of the 200 new Brooklyn Rapid Transit "Safety" Cars, all of which are equipped with "Bungalow" air compressors.

"Bungalow" type air compressor

The "BUNGALOW" air compressor, essentially a "Safety" car machine, has been included in all the largest installations.

From the big metropolitan cities, where the greatest density of street car traffic exists, comes the most urgent call for air brake equipment that will give reliable service and insure freedom from traffic tie-ups and delays.

Such is Brooklyn, N. Y., for whose busy surface lines the Brooklyn Rapid Transit Company recently selected "Bungalow" air compressors for its entire number of 200 new "Safety" cars.

Over **3252** "Safety" cars now running on **182** different electric lines throughout the United States, are equipped with "Bungalow" compressors.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

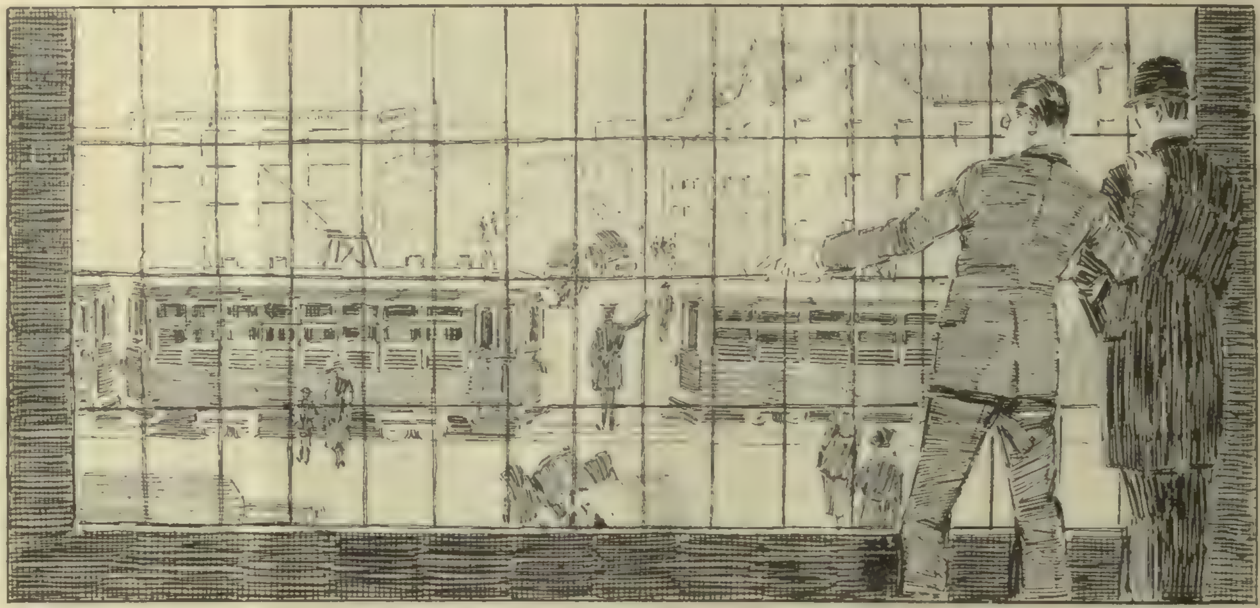
General Offices, Pittsburgh, Pa.
Works, Wilmerding, Pa.

TRADE MARK

New York
San Francisco

Washington

Chicago
St. Louis



Said A Traffic Superintendent

"It's the Quick Stop and the Quick Start of the Safety Car

that have helped us to reduce the congestion on this street. With the old cars we would never get through the neck of the bottle fast enough. So much time was lost in closing the rear doors by hand, in getting the starting signal to the motorman and in notching up slowly on those old-time motors. And, of course, in making a stop the fact that we had old-fashioned brakes and a heavy car didn't give us the chance of slipping by a crossing just before the cop put on the 'Stop-Stop.'

"Those seconds gained here or there may not seem much to you, but they count up in the course of the day's work of a car, believe me.

"With the front-entrance operation of these Safety Cars, there's no chance for slack in the interchange of passengers. The door is closed by air, the very moment the last passenger's aboard. There's no waiting for signals from a conductor, either. A wave of the hand from the traffic cop and zip!—there she goes across with a faster getaway than many a gas wagon.

"Some car, boy, some car!"

Is a Safety Car *because*

it is equipped with automatic, laborless apparatus so interlocked, that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the airbrakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

SAFETY CAR DEVICES COMPANY

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO
Railway Exchange Bldg.

WASHINGTON, D. C.
Munsey Bldg.

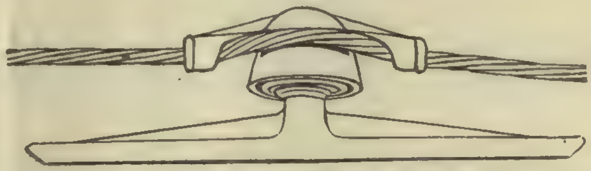
NEW YORK
City Investment Bldg.

PITTSBURGH
Westinghouse Bldg.

SAN FRANCISCO—Southern Pacific Bldg.
CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.

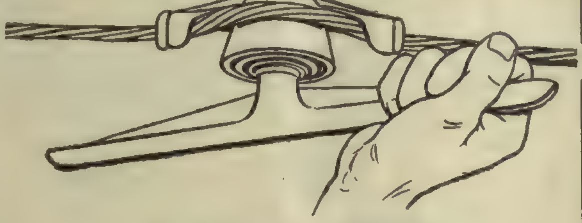
O-B PRODUCTS

Quality First

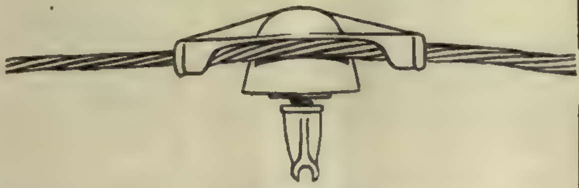


Usually the ear is out of line with the trolley wire when it first makes contact with the hanger.

With Ordinary Hanger—

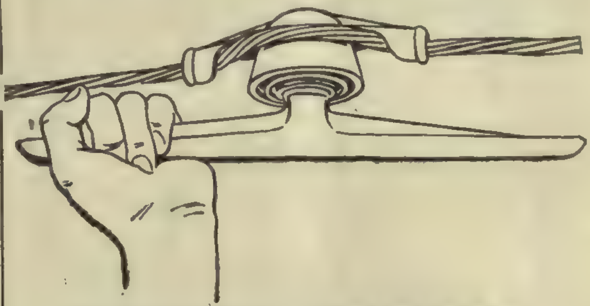


the ear must be backed off—

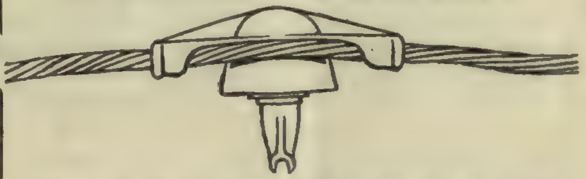


and leaves a loose joint between ear and hanger.

With O-B Lock Hanger—



the ear is turned still further and makes a



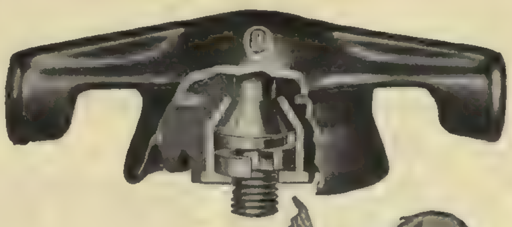
tight, solid joint between lock hanger and ear when the latter comes in line with the wire.

That Internal Lock Washer Improves Your Line

Tight, weatherproof joint between every ear and every O-B Lock Hanger cuts your maintenance cost. With the ordinary hanger either much time is wasted shimming up the joint or the lineman lets it go as a sloppy job.

This never occurs with O-B Lock Hanger. And they have all the essential mechanical and electrical characteristics.

There are different sizes and types shown in O-B Catalog No. 17.



The Ohio Brass Company

Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago Los Angeles San Francisco Paris France

Manufactures: Trolley Material, Rail Bonds, Car Equipment, High Tension Insulators, Third Rail Insulators

Phono-Electric

On Old York Road to Famous Willow Grove

In winter—the stress of weather up to snow-fence severity!

In summer—a 30-second headway to the best summer concerts in America.

At all times—the grades and curves so often met on lines that began as follow-the-road trolleys.

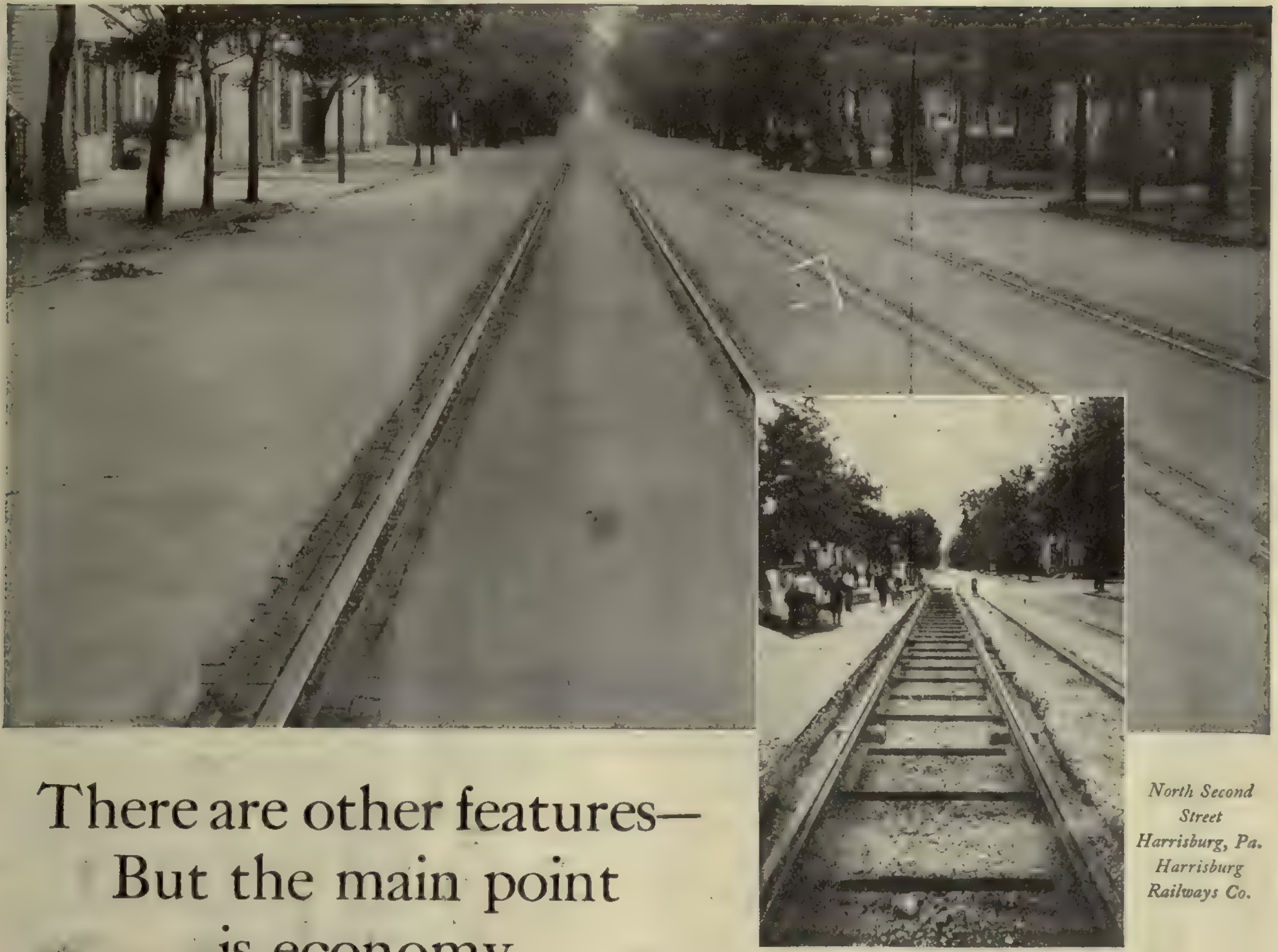
To insure SAFE operation, there's elaborate signal system.

To insure UNBROKEN operation, there's the use of breakless Phono-Electric Trolley Wire.

Of which the Philadelphia Rapid Transit Company has scores and scores of miles in use in all classes of city and suburban service.

Bridgeport Brass Company

Bridgeport Connecticut



North Second Street
Harrisburg, Pa.
Harrisburg Railways Co.

There are other features—But the main point is economy

MORE important just now than ever before, the overshadowing fact about Steel Twin Tie Track is its first cost economy.

Economy of materials because all the concrete in the track foundation takes its share of the load through the three-foot by thirteen-inch bearing plates.

Economy of labor because of the simple taper jaw rail clip and the elimination of gauging and excessive surfacing.

The eleven years of facts behind Steel Twin Tie Track make an imposing collection of data. But they may be boiled down to two words—Permanence and Economy—the two essentials of good engineering.

The International Steel Tie Company
Manufacturers of Steel Twin Ties and Crossing Foundations
16702 Waterloo Road CLEVELAND, O.

Steel Twin Tie Track

STYLE "N" COLOR LIGHT SIGNALS

UNION equipment will solve *your* interurban traffic problems. Let us study your operating conditions and co-operate with you in considering what *automatic block signaling* will do for *your* line.

Union Switch & Signal Co.

SWISSVALE, PA.

These Keystone Specialties are Standard Equipment on nearly all Safety Cars.

Golden Glow Headlights

Keystone Rotary Gongs

Keystone Air Sanders

Keystone Trolley Catchers

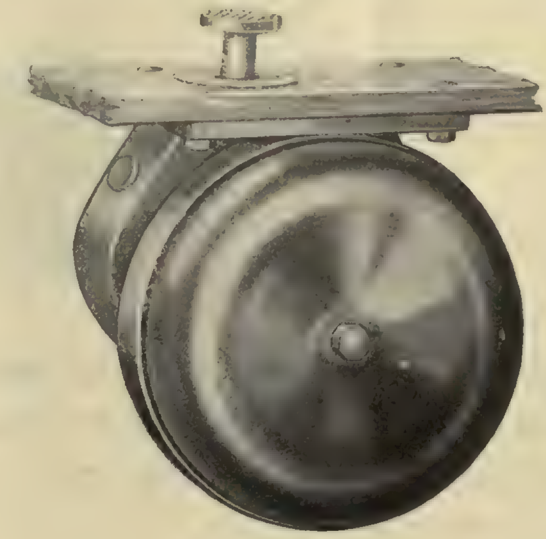
Faraday Car Signal Systems

Keystone Steel Gear Cases

Keystone-Hunter Destination Signs

Always specify them for they will serve you well. Write for Bulletin No. 167, showing many other Keystone specialties for use on safety cars.

Keystone Rotary Gongs



Standard equipment on the safety car and designed to meet the traffic conditions today—loud enough to be heard above the noise of the city streets.

The old single stroke bell—one ring for each kick of the motorman's heel—is too familiar to attract attention, but—this one will! One pressure of the foot gives a steady ring of a dozen or more strokes on the gong and the sound carries far and compels attention. Solidly built of rugged malleable iron and steel moving parts and housed for protection against dirt.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

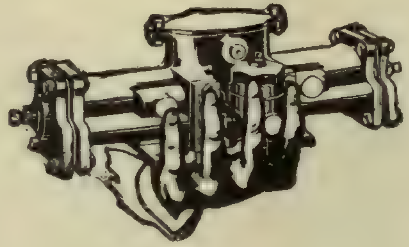
NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

Don't sell your big cars; convert

Standardize!



Until the coming of the standardized light-weight safety car, rolling stock practice was just a see-saw from small cars to big cars and back again.

Every company tried to settle on some one size of car that would not be too small for the heavy hours and too big for the off hours.

To-day the safety car is the accepted standard on many properties for operating the base schedule throughout the day, leaving on hand a great variety of large cars that are too costly for light service.

There is no reason, however, why these large cars should not be transformed and standardized to give

Make your peak periods produce

National Pneumatic Company, Inc.
50 Church Street, New York Edison Bldg., Chicago
Works: Rahway, N. J.

them to real "Rushour" cars

Pneumatize!

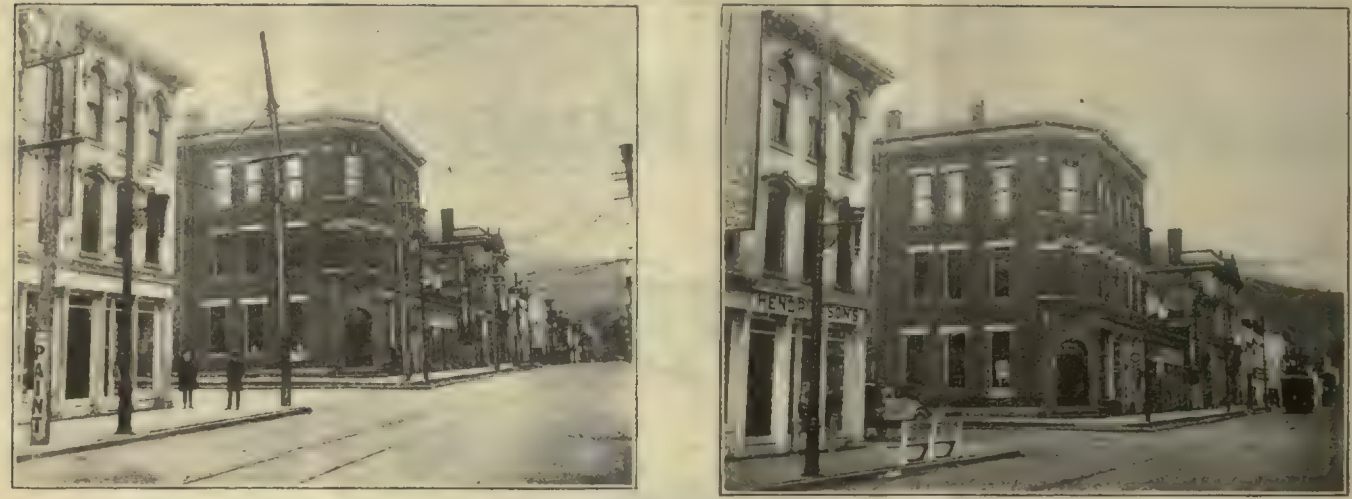
the same platform economies as the safety car and also a higher rate of passenger interchange and effective fare collection than was deemed possible before the development of *National Pneumatic* car speed-up devices.

This transformation and standardization can be effected by reconstructing your present cars and arranging to design your future cars to the *National Pneumatic* "Rushour" type in which the need for adaptability to changing methods of operation is the basic guide for the installation of *National Pneumatic* Door Engines, Safety Interlocking Door Control and Door and Step Operating Mechanisms to

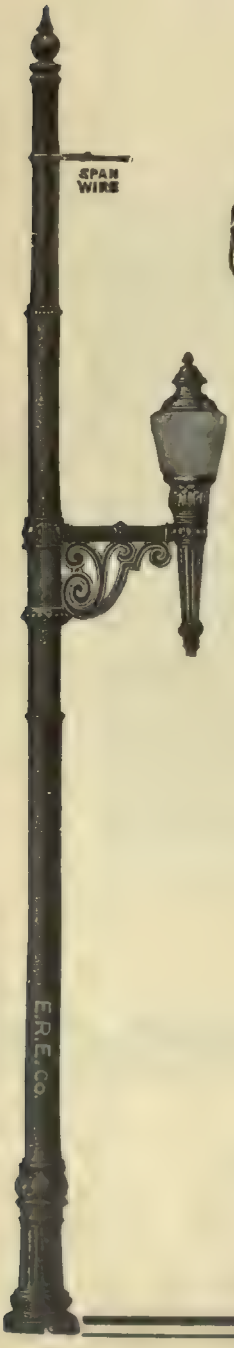
maximum profit and efficiency

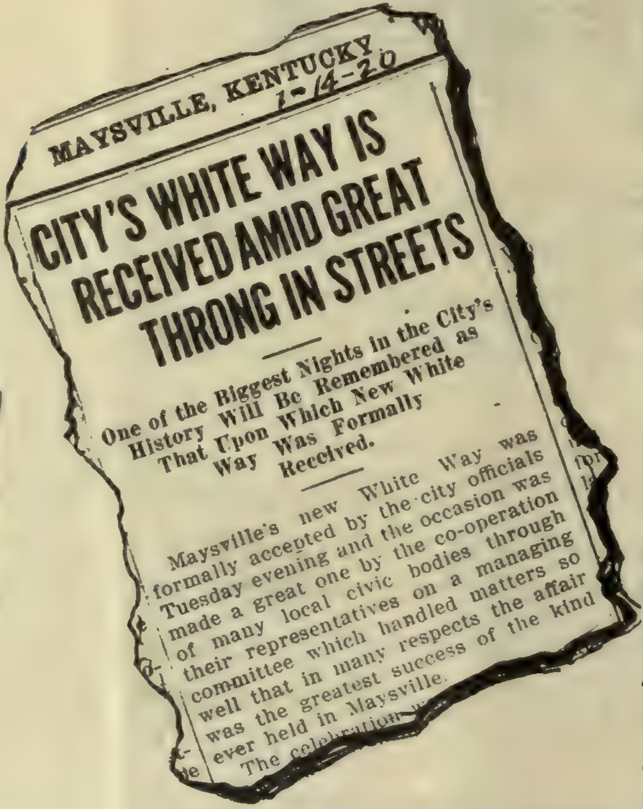
National Pneumatic Company, Inc.

50 Church Street, New York Edison Bldg., Chicago
Works: Rahway, N. J.



Maysville, Kentucky, showing street scene before and after Elreco Combination Railway and Lighting Poles were installed.





MAYSVILLE, KENTUCKY 1-14-20

CITY'S WHITE WAY IS RECEIVED AMID GREAT THRONG IN STREETS

One of the Biggest Nights in the City's History Will Be Remembered as That Upon Which New White Way Was Formally Received.

Maysville's new White Way was formally accepted by the city officials Tuesday evening and the occasion was made a great one by the co-operation of many local civic bodies through their representatives on a managing committee which handled matters so well that in many respects the affair was the greatest success of the kind ever held in Maysville.

The celebration

Maysville, Kentucky

is the latest city to gain prominence by its progressiveness in installing a real "White Way."

The excellent design of this ornamental Combination pole is really the secret of its success because it carries not only the span wires of the railway but lighting wires as well—thus enabling the cost to be divided between the railway company and the lighting company.

In some of the best appearing cities in the United States electric railway companies and the city authorities have gone 50-50 on a real "White Way"—which has been a success in every instance because it is good business for all concerned.

Electric Railway Equipment Co.

Cincinnati, Ohio

30 Church St., New York City

ANACONDA
COPPER
WIRE

By controlling its own supply of raw material, Anaconda is enabled to keep production at a normal basis.

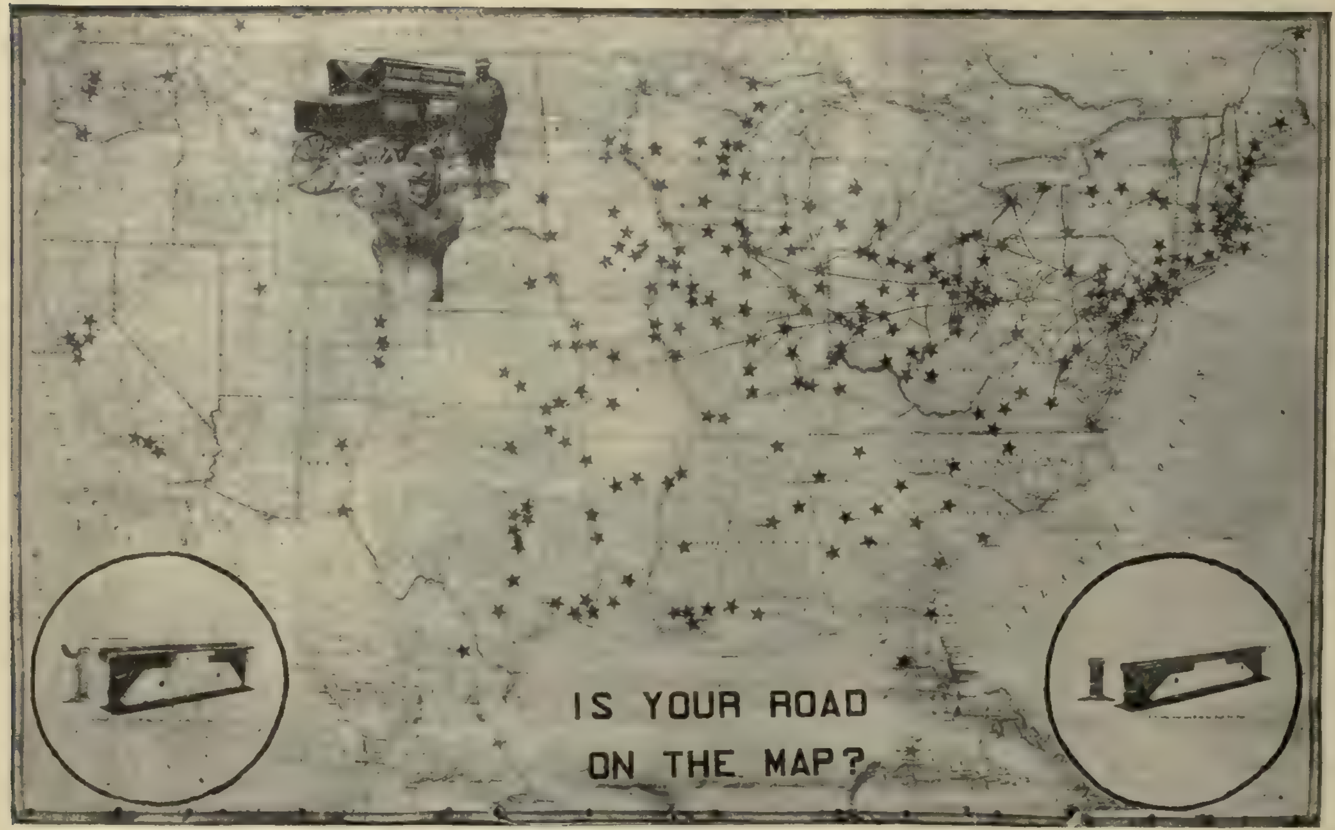
Each month millions of pounds of ore are converted into copper wire and cable at the Company's Rolling Mills at Great Falls.

Every step of the manufacturing processes, from the time the ore is taken from the mines until the finished product leaves the shipping rooms is carried out under centralized supervision.

Whatever your requirements may be the Anaconda Mills are prepared to supply them. Whenever you think of copper wire think of Anaconda.

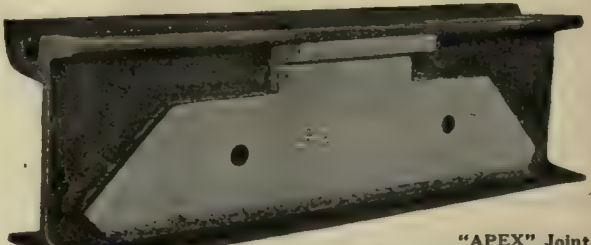
"From Ore to Finished Product"

Anaconda Copper Mining Company
Rolling Mills Department
Mills—Great Falls, Montana
General Office: 111 W. Washington St.,
Chicago.



From Coast to Coast

INDIANAPOLIS Apex Welded Joints



"APEX" Joint
for Guard and Girder Rail

Eliminate Joint Maintenance! One of the Biggest Items of Operating in Paved Streets

Protect your car rider and equipment from the jar of every low joint and build it up as strong as newly laid steel rail with Indianapolis Apex Joints.

Tests on Indianapolis Apex Joints conducted by Robert W. Hunt Company of Chicago, Ill., showed a deflection of but .018 in. under maximum wheel load. Tests of Indianapolis Simplex Joints, made by the Bureau of Standards, Washington, D. C., showed the conductivity of this joint as 138 against 100 on unbroken rail.

Economy in track expenditures is vital. Better bonding is imperative as the cost of power losses increases with the increasing cost of coal.

Delays means further expense. Let us explain in detail.

Welders—Joints—Steel—Eye Lenses.

The Greatest Aid of the Way Engineer

INDIANAPOLIS SWITCH & FROG COMPANY
SPRINGFIELD, OHIO

CHAPTER SEVENTEEN

THE ALL-*BUT* PERFECT STATE

They'll Be Fond of the Bond

The financial bonds of a road in the All-But Perfect State, as has been stated before, will be in the hands of the local men, their wives and widows.

Then come what will in the form of national events, Gibraltar-like the local road will not only stand —but run.

It will be a cooperative affair, and, did you ever hear of a strike in a cooperative or family movement ?

True, there may be dissensions at times—they occur even in the best regulated families—but they are generally patched up without loss of life, limb or money.

This close cooperation due to the financial bond will be reflected also in the electrical bond which will cooperate so closely with the rail that it becomes an inseparable part of it—simply because it will be a Lincoln Continuous Bond welded with a Dynamotor—permanent as relatives.

READING NUMBER SEVENTEEN.

Q. Then your continuous bond doesn't do its full duty unless welded with the Dynamotor?

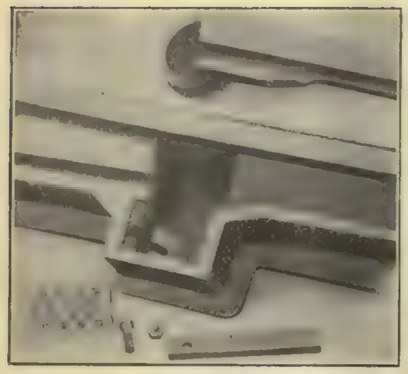
A. As a general thing—yes—but they ought to be put on with the Dynamotor for that is the best means known to do the job—and then after they are on you can put the Dynamotor to work on repairs in the shop in order to pay for itself and interest on the investment.

Rail Welding and Bonding Company

Formerly The Lincoln Bonding Co.

RW&B

Cleveland, Ohio.



H. C. B. Switch

WHARTON SPEC

SWITCHES
MATES
FROGS
CROSSINGS

Solid Manganese Steel and Manganese Steel Insert

Converter and Electric Steel Castings
Hammer and Press Forgings Seamless Steel Gas Cylinders

WM. WHARTON, JR. & CO., INC.

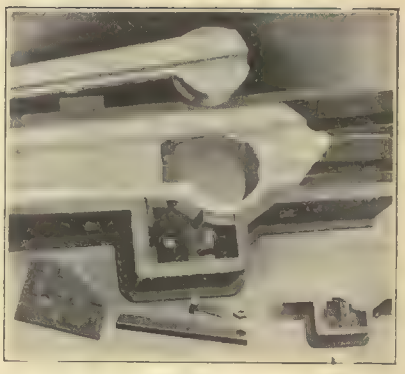
EASTON, PENNA.

"Originators of Manganese Steel Track Work"

SALES OFFICES:

Boston, Mass.
Chicago, Ill.
Denver, Colo.
New York City
Philadelphia, Pa.
Pittsburgh, Pa.
San Francisco, Cal.
Scranton, Pa.

AL TRACK WORK



"GIANT HEEL" Switch

The illustration below gives a comprehensive view of our large Layout Yard, where Special Track Work is assembled and carefully fitted together, to avoid any possibility of trouble during installation. No piece of work leaves our plant without such careful fitting.

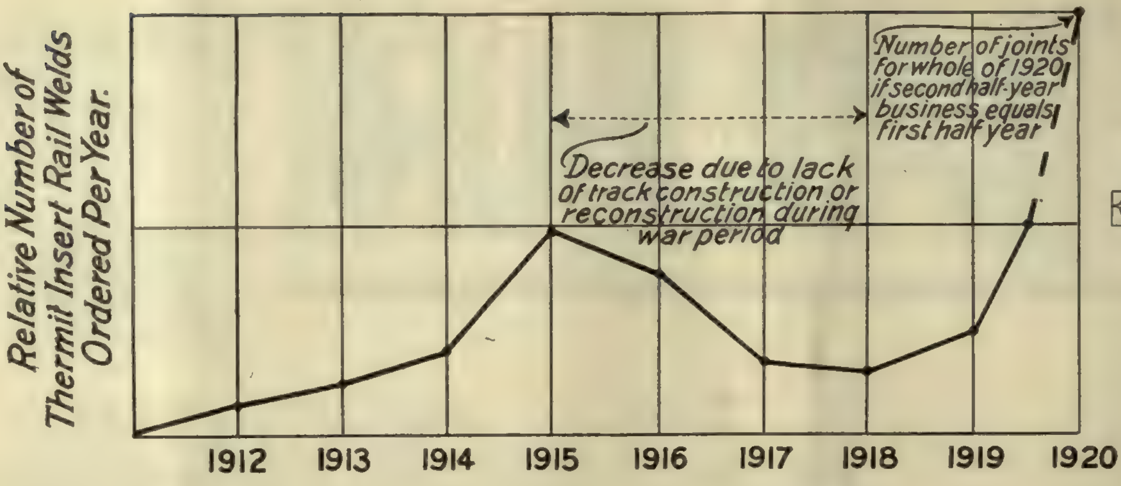
Our extensive, modern plant, illustrated on the preceding page, is equipped to fabricate track work of all constructions, Solid Manganese Steel, Manganese Steel Insert, Plain Bolted and Manganese Steel "T" Rail, etc., which, coupled with our long experience, places us in a position to supply your needs efficiently.

***Subsidiary of* Taylor-Wharton Iron & Steel Co.**

High Bridge, N. J.

Other Plants:

TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
PHILADELPHIA ROLL & MACHINE CO., Philadelphia
TIOGA STEEL & IRON CO., Philadelphia

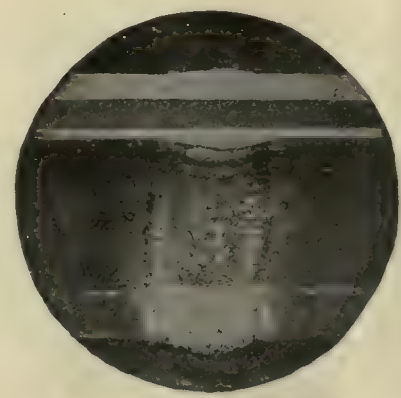


When Orders for Installing

Thermit Insert Rail Welds

have more than *doubled* in rate those of the best previous year, with prospects of greatly increasing this ratio before the year ends, there can be only one reason for such success and it lies in the weld itself, which for a period of over seven years has proved capable of meeting every requirement. We can claim with absolute truthfullness that the Thermit Insert Rail Weld, when properly made, will not cup even under the most severe service, and that the number of welds which will break in service will be so small as compared with the total welds made that they can hardly be figured in percentages at all.

Start in at once making your rails *continuous*, by



Thermit Insert Welding before cold weather sets in, and it is too late.

METAL & THERMIT CORPORATION

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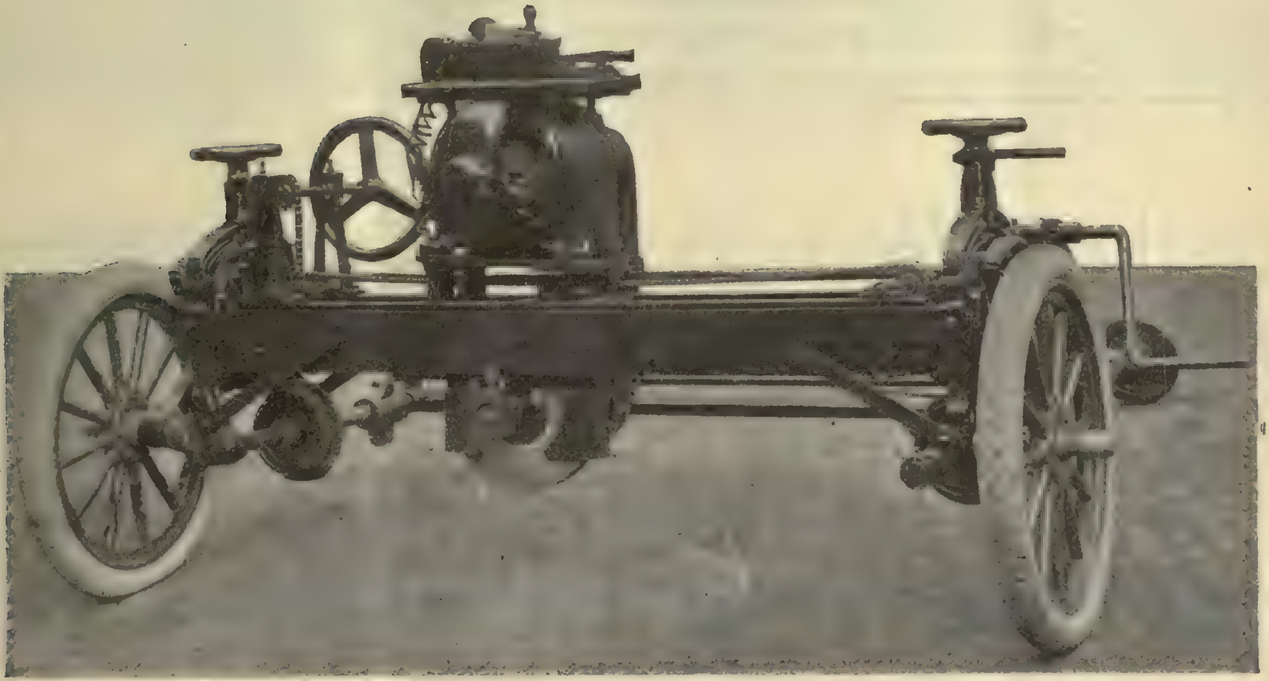
The Universal Rotary Track Grinder



Will Grind Rail Head at Any Angle

The Universal Rotary Track Grinder will grind Rail Head at any angle. This This is an absolute necessity in grinding off new or welded joints in girder rail where the face of the rail is inclined toward the groove.

Outboard Bearings Stabilize the grinding wheel.

The Universal Rotary Track Grinder has bearings on both sides of the grinding wheel. Adjusted on a three-point suspension, the bronze bushings of the bearing take up wear.

A direct Drive Motor.

Is mounted on a hinged plate. The drive is direct to the grinding wheel, making it impossible for drive to get out of alignment. The tightening of belt is accomplished by the adjustment of one bolt only. To insure a gradual run off, an adjustment, at either end of the machine, for raising the grinding wheel clear, has been provided.

It is equipped with large pneumatic derail wheels and an adjustable outrigger. It embodies ease of adjustment and operation and a low working economy.

We also make the "Atlas Rail Grinder" and "Reciprocating Track Grinder"

RAILWAY TRACK-WORK CO.

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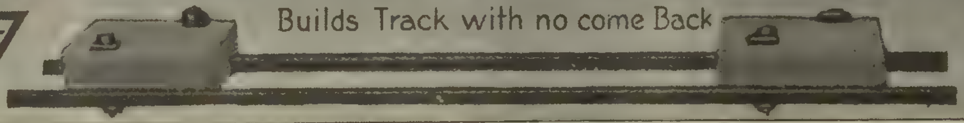
The RESILIENT RAILWAY TIE

DMT Co



Builds Track with no come Back

DMT Co

In the construction of new road-bed, an important factor to be considered is

Resiliency

A resilient road-bed is not only less noisy and more easy riding, but lessens wear and tear on equipment.

Dayton mechanical ties afford this resiliency so important in modern track construction. A cushion of asphalt is the shock absorbing medium. Result—Resiliency.

Build your track with no comeback.

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

Indiana Service Corporation

formerly

Ft. Wayne and Northern Indiana Traction Co.

Economy Meter with Special Inspection Dial

ECONOMY Power-Saving Meters by recording the kilowatt hours consumed, show both the motorman and the management the individual "power bills." Thus they get down to the very fundamentals of energy checking and saving. In addition, individual car energy records afford data of high engineering value and a convenient basis on which to inspect car equipment.

Orders

ECONOMY METERS

This progressive road has ordered ECONOMY METERS for all its interurban cars because—*It Will Meter the Energy—That's What it Wants to Save.*

As a Power-Saving Device—

The meter gives the most accurate and most informative unit for the comparison and follow-up of the motorman in the operation of the cars.

As an Inspection Device—

The meter provides a continuous record of inspection intervals, instantly available without clerical labor.

As an Engineering Device—

The meter furnishes data on the power consumption of different types of equipment when operated under varying conditions.

Economy Electric Devices Company

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National Railway Appliance Co., New York
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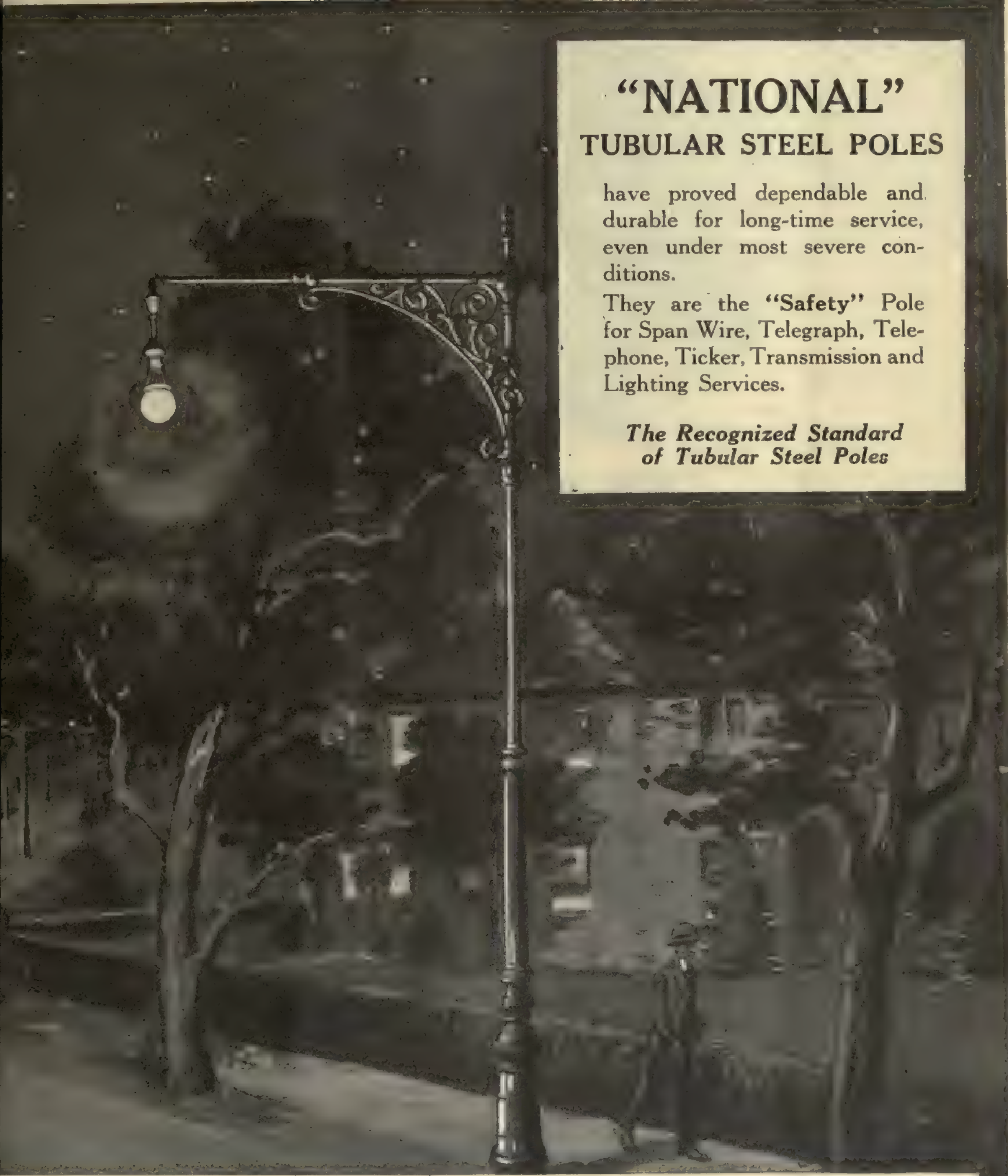
"NATIONAL"
TUBULAR STEEL POLES

answer the demands of civic pride for efficiency in service together with enhanced attractiveness of modern business sections and residential districts. They help greatly to make a **City Beautiful.**

STEEL FOR SERVICE



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have proved dependable and durable for long-time service, even under most severe conditions.

They are the **"Safety"** Pole for Span Wire, Telegraph, Telephone, Ticker, Transmission and Lighting Services.

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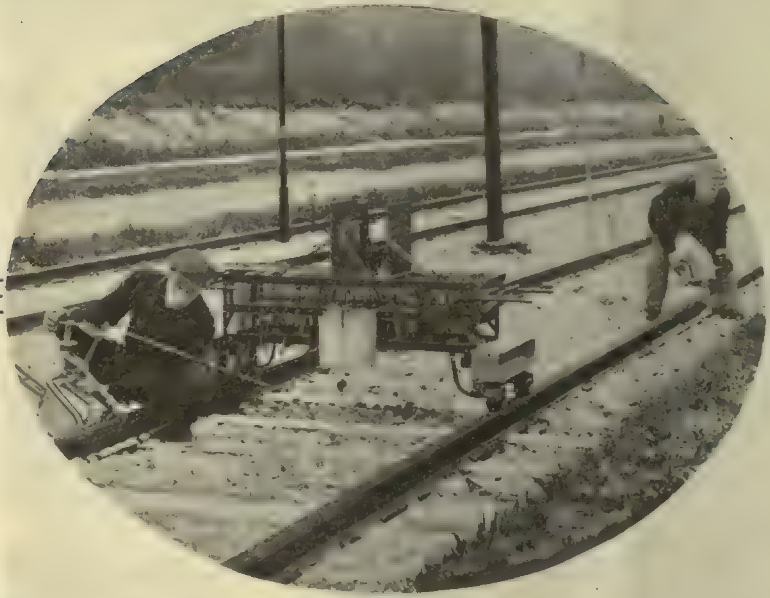

The ERICO Portable Railbonding Apparatus

For pick up work—a few bonds to install here and there — put an Erico on the job. It's the speediest and most economical method of handling this class of work on the market today.

Two men follow after the section gang with a light outfit that can clear at a moment's notice and pick up the gaps in the return circuit.

And for straightaway bonding—100 bonds per day are readily installed.

Erico Bonding Apparatus not only assures good work—*it thoroughly discourages bad work.*

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THE ELECTRIC RAILWAY IMPROVEMENT CO.
Cleveland, Ohio

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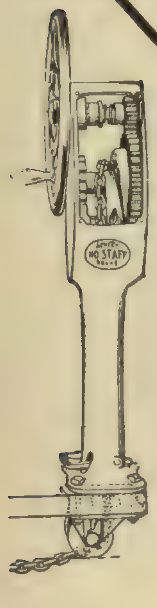
Found The World Over

ACKLEY BRAKES

Economy

In first cost and in maintenance Ackley Brakes are the Soundest Investment.

The Ackley No-Staff—Bulletin D



Reliability

Our repeat orders are the best evidence of Ackley performance.

The Ackley 2-E (Staff)—Bulletin E

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CONDULETS

TYPE FS

Condulet with gas, vapor and dust proof cover—for push button switches.

TYPE ZYC

Safety-First motor starting switch. Door cannot be opened while switch is on.

TYPE GS

Condulet with gas, vapor and dust proof cover, for rotary snap switches.

Iron Clad Safety Switches

PROTECTION for labor and equipment constitutes a vital part in the economic program of most of our industries.

The ever increasing use of electricity necessitates the adoption of the most efficient electrical switching devices.

Condulet switches here shown fulfill requirements by enclosing all live parts in substantial cast-iron housings. Cast-iron is the best metal for the purpose because it withstands the corrosive action of dampness and acid fumes.

Send for Condulet Catalog.

CROUSE-HINDS COMPANY

SYRACUSE, N. Y.

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Condulets Panelboards
Knife Switches Floodlights
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TYPE MKC

Iron clad safety-first line switch. The door is locked while switch is "on."

TYPE MFC

Safety-First motor starting switch. This switch cannot be operated from "off" to "run" position without first going to "start" position.

Condulet the Job

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Why metal tickets?

Why should you use Johnson Fare Boxes and Johnson Metal Tickets on your property?

There are a lot of reasons. Here are a few.

Their use permits charging fares involving fractions of a cent and the transfer from one fare schedule to another without change of coin.

Amount of cash handled by conductors is reduced to a minimum and the chance for errors or dishonesty is reduced to a minimum.

Company receives a large portion of its receipts prior to time service is rendered to customer.

Their use tends to decrease congestion in loading because change making is not required, and this decreases length of stop and makes for faster schedules; also permits conductors to give more attention to other duties.

Their use tends to encourage riding habit because experience shows it easier to part with a ticket than to "break" another coin.

It is easier to examine metal tickets than multiple fare units on the inspection plate of fare-box.

Metal tickets outlast any other tickets and it is difficult to counterfeit them.

Any fare value may be placed on a metal ticket, and the modern type of fare-box will record the exact amount represented.

The work of accounting department is simplified.

That these are facts, not theories, is evidenced by the way orders for Metal Tickets are being received from many properties using this efficient system of fare collection.

Any of these companies will verify the above. We'll gladly give you additional data. Write today.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.

One of fleet of 24 White Trucks owned by Georgia Railway and Power Co.

Twenty-Four White Trucks Serve Georgia Railway and Power Company

IN supplying current to nearly every city and town in northern and central Georgia, the Georgia Railway and Power Company operates three water-power plants, the largest at Tallulah Falls, producing 100,000 horse-power. The others are at Morgan Falls and Gainesville, and produce 14,000 and 2,000 horse-power respectively. Two steam plants of 14,000 horse-power are located at Atlanta.

In addition to its electrical properties, the company operates the street railways in Atlanta and Gainesville, and is the parent company of the Atlanta Gas Light Company, which supplies artificial gas to Atlanta.

For the maintenance of these projects, a fleet of 24 White Trucks, the first unit of which was installed in 1912, is constantly in operation.

These White Trucks are called on for the hardest performance in all sorts of weather and over all kinds of roads. In each line of endeavor they have given dependable and economical service.

THE WHITE COMPANY
CLEVELAND

White Trucks

THERE is no single factor contributing to operating efficiency that is of more importance than correct lubrication. Tie-ups, repairs and withdrawal of equipment are expensive propositions and may be traced so often to improper lubrication that to take chances with ordinary oils is simply inviting trouble.

Galena Service provides first, the reliable Galena Quality lubricants—the best that can be made; second, the personal services of lubrication experts, who install and put in operation the scientific methods perfected by this company. The close, constant supervision and co-operation of these experts insures an economical and satisfactory service that is proving its value on the greatest railroad and traction lines in the world.

The records of hundreds of competitive tests show that Galena Oils and Galena Service are an invaluable aid in bettering operating conditions and that the savings effected through their exceptional ability is a decided factor in reducing operating costs.

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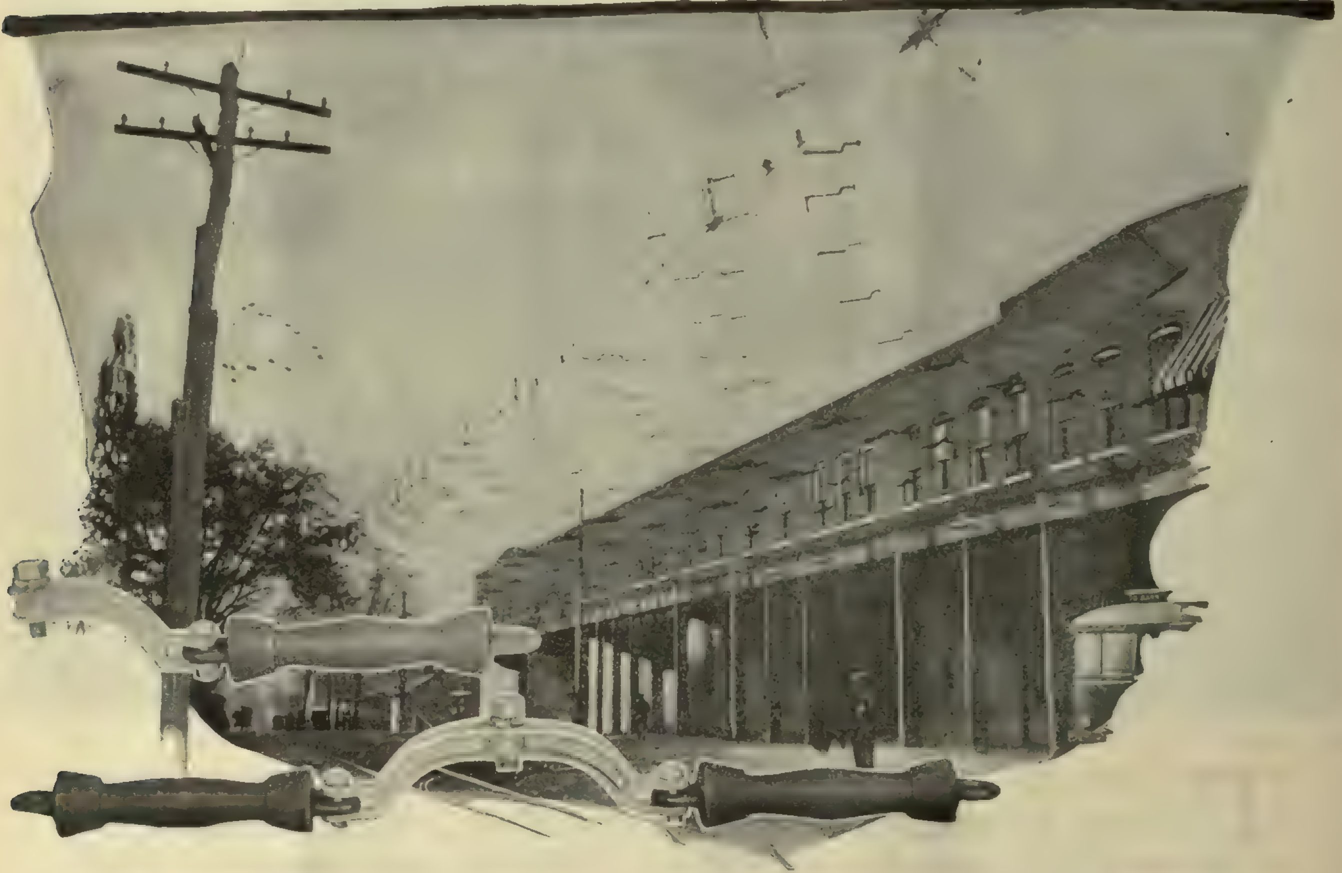
and all principal American cities
LONDON TORONTO BUENOS AIRES MONTREAL PARIS

The popularity of a device is a fair index of its value and ability to give continued satisfaction in service.



Used by Everyone Everywhere

There is hardly an electric railway in the United States, using the direct suspension construction in the overhead, that does not use

G-E Form S Pull-overs

Many thousands of these combined hangers and wood strain insulators are sold each year to swell the numbers of the thousands in service. Their sturdy construction makes them ideal for yard work.

Made single and double for 600-volt service

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 56 New York, Saturday, September 4, 1920 *Number* 10

Cock-and-Bull Story Starts Strike in Brooklyn

THE facts elicited at the hearing before the New York Public Service Commission on Tuesday of this week clearly show the haphazard way in which the present strike in Brooklyn was called. A meeting attended by some 3,000 employees is held early Saturday evening and adjourns after a "no-strike" vote is taken. A later gathering, held shortly after the ghostly hour of midnight and attended by a smaller number of employees who were unable to be present at the first meeting, becomes excited over a mysterious story that the company had declared a lockout of its power station men, and declares a strike. The legend about the lockout is found later to have no foundation, but the evil has been done and a transportation system which is practically essential to a community of some 2,000,000 inhabitants is seriously crippled. Events like this do not enhance the prestige of the labor organization in control in Brooklyn, nor do the extortionate demands of the men, which, according to Receiver Garrison, would require the company to pay out for wages more than the gross receipts. They also emphasize the importance of some means by which strikes in public utilities would be impossible.

Wages Determined by Supply and Demand

THE Nebraska State Railway Commission has taken action which it appears to us is a departure from anything previously done by regulating commissions in that it has acted upon the question of wages to employees of a public utility. As indicated in our news columns last week, the commission argues in its order in the Omaha & Council Bluffs Street Railway Company wage controversy that the Nebraska Constitution permits the commission to assume jurisdiction in wages on the theory that the wage determines the number of men who will be attracted to this employment, and that this fact, in turn, affects the service of the company, over which the State Railway Commission admittedly has jurisdiction.

On this basis the commission justifies itself in neglecting all consideration of cost of living and wage standards, open shop and unions. It does, however, state that there is "no place for a strike in the public economy of a state that has provided for regulations."

The hearing was not an arbitration. The conclusion reached after investigating various other similar lines of work was that the wage paid is sufficient to attract suitable men and that, if this is so, service is insured and the commission's duty ends.

We wonder if this is not in line with the "principles of ordinary economic and business common sense" recommended by the Federal commission in its recent report. According to Einstein's theory of relativity, how do we know anything is so unless it is referred to something else? Likewise, how can we determine a fair wage unless we have something to refer it to? And what better comparison can we make than by seeing whether a given wage attracts the necessary numbers of men of satisfactory qualifications? A similar proposal has been made with reference to determining the proper return to capital.

True, there may be pitfalls in such arguments applied to public utilities, and we would not neglect the effort made to improve living conditions for all. But our present labored means of determining both reward to labor and return to capital are surely somewhat artificial, and it is refreshing to anticipate relations based on natural economic laws.

Report Is Favorably Received and Will Prove Beneficial

BELIEVING that the industry would be interested in obtaining the views of a number of railway men in different parts of the country this paper has attempted to make a quick canvass, quite difficult in this vacation season, and a few representative views are published elsewhere in this issue. We hope to publish others later and invite contributions and discussions on this important report.

The views already secured show general unanimity on the value placed by the industry upon the work of the commission, and we might add that the general sentiment in the daily press is in line with this view. It is of interest and value to note that every one urges full publicity and welcomes the report as an opportunity to get the facts of the situation adequately portrayed to the public.

We hope indeed that the report will mark a turning point in the history of the industry. The electric railway has been termed the "sick man of business," and while this report shows clearly that the patient has been suffering from a variety of causes, it proves with equal definiteness that he is worth saving.

He is organically sound and is capable of doing work which no other agency is able to perform. Yet in some respects the treatment recommended is a severe one if credit, which the commission says is one of the two serious needs of the industry today, is to be re-established.

For instance, at one point the report says that "utilities are entitled to a fair return upon the fair value of their property used in public service at the time of the inquiry." But it also says that "no permanent solution of the electric railway question can be found in the absence of a finding of value for rate-making purposes" and that "the valuation, when once fixed as the basis for the financial return of the company, should logically come to affect the amount of capitalization," and that the company "should voluntarily reduce any excessive capitalization to conform to such valuation as may have been determined upon."

Although a logical argument can be built up in defence of a capitalization independent and not directly related to valuation, we believe that the position taken by the Federal Electric Railways Commission on this point is a sound one. Such a policy, we realize, will bear hard on some companies. To continue the metaphor already used, in their cases the sickness calls for a major operation. But even with them we believe that this course is better than a continuation of the present situation. They are not earning now a fair return on their value, and while this value may not be as large as their capitalization, the two approximate much more closely, we believe, than the public as a whole realizes. We are not referring to this phase of the report because it is of the most importance, for there are many other recommendations which have a much stronger bearing upon successful operation. We are mentioning it because it is part of the program recommended by the commission which is largely in the hands of the companies.

Broadly speaking, the establishment of official values for the various electric railway systems, the abolition of high taxes and other non-railway imposts like paving, and the grant of a rate of fare under which a fair return would be earned on the valuations officially established would be a great boon to the railways and to the communities served by them. It would mean that a necessary system of transportation would be continued under circumstances which would warrant its expansion and improvement according to the needs of the public.

Municipal Ownership Not Considered the Logical Solution

AN INTERESTING and instructive aftermath to the publication of the report has been the statement distributed by Dr. Delos F. Wilcox and mentioned on another page of this issue. It will be remembered that after accumulating a vast amount of testimony and data the commission secured the services of Dr. Wilcox to digest and analyze this testimony. This analysis was made by him, and, in his opinion, pointed to municipal ownership as the logical solution of the electric railway problem. Hence he included in his analysis a recommendation to this effect. The commission commended the analysis and adopted, as part of its report, some of the statements contained in it, but when it came to deductions from the facts the commission made certain recommendations which differ from those of Dr. Wilcox and with which he strongly disagrees. Without expressing any opinion in the case, we believe these are the facts.

Dr. Wilcox says that the commission declares both municipal ownership and service-at-cost are experimental and that it chooses the latter while he chooses the former. As we analyze the situation, it is not quite so simple as that. The commission, viewing the matter from the national standpoint, and it must be remembered that five of its eight members were appointed as representatives of the public, believes that the testimony and facts indicate that greatest usefulness to the public will result from a continuation of private operation and that the service-at-cost arrangement will probably prove one very useful means of establishing a satisfactory basis for this. It does suggest that any steps taken now should not impede the public in taking over the industry, should it so desire. But there are many problems, more pressing, if not more fundamental, to which energies may well first be directed.

As to the publication of Dr. Wilcox's study, it is to be regretted that funds have not been made available for its publication. If it is a "masterful analysis," it would save the time of every one desiring to digest the testimony. But it is doubtful if the effectiveness of the commission's report has been decreased by the fact that this analysis was not published by the commission.

Fare Is Not the Only Factor Which Affects Riding

VARIOUS conclusions are drawn from time to time as to the effect of changes in fare on riding, based on a comparison of the number of passengers carried during a certain period before and after the fare was increased. There is no doubt that the rate of fare affects riding, but it is only one of many causes, some more important than others. It would certainly be erroneous for any one to assume that changes in fare are the only or even the controlling influence which affects riding.

Some other factors are: (1) Headway of cars; (2) speed of cars; (3) comfort, etc., of cars; (4) courtesy, etc., of employees; (5) popularity of management; (6) weather; (7) general industrial activity of community; (8) general industrial activity of certain sections of the city with large traffic requirements; (9) population; (10) prosperity of community; (11) trackage in service; (12) competition from public and private automobiles.

We also want to warn electric railway statisticians of the danger of too readily accepting as still true the old rule that an annual increment in passengers of from 3 to 5 per cent might be expected, so long as no changes are made in fares. This rule was based on the theory that as the population increased from 10 to 20 per cent during the ten-year period, or from 1 to 2 per cent per annum, the riding would increase in even greater proportion. This, indeed, was the experience on American city properties for many years. It was during a time, however, when the length of line was constantly being increased by the construction of extensions and other track facilities. It is quite probable that these extensions had as much, or more, to do with the increase in traffic as did the increase in the population. Where there has been no increase in track, as during the last few years, it is unsafe to expect a large increase in riding even with an increase in population.

This Valuation Will Possess Special Interest

THE much-valued Public Service Railway Company of New Jersey is to be valued once again and it is to be hoped that the results this time will constitute a forward step in valuation theory and practice. As has already been noted, the engineers, Ford, Bacon & Davis, employed to make the valuation under the recent law are empowered to determine the "value" of "all the property, including every proper and lawful element thereof." No restriction, other than being required to use and consider all data collected in previous studies, is imposed on the engineers, and no definition of value is laid down. It is then the law that the "value" thus determined "shall be admitted as evidence in courts and shall be evidence of facts therein contained" as if "the same had been produced and proved" and "shall be accepted by the Public Utilities Commission as the value of said property . . . in any rate proceeding . . . to the extent that the value of the property is a factor in the fixing of a rate."

What view the United States Supreme Court might take of the value as determined in this manner or under this law is somewhat problematical, to say the least. But it appears to us that the very uncertainty of the attitude which various authorities and critics may take affords an opportunity to as well as imposes a duty upon the engineers.

The opportunity is to give authority to such sound and logical developments of valuation practice as have been made by the engineering profession in the intensive study that has been given to this subject in the past ten years. The duty lies in selecting and presenting such developments with conservatism and force. In this valuation by such a process there will not be opportunity for having widely varying figures set down side by side to beget confusion and unending debate. It is hoped that the standards adopted will be so clearly and fully set forth that commissions and courts can compare or reconcile them with their own interpretation. And it is further hoped that the electric railway industry as well as all other public utilities will out of this proceeding secure some firm ground to stand upon in answering the question as to what their property consists of and what it is worth.

Cheap Power Is a Transportation Essential, but——

WE SYMPATHIZE with the railway power superintendent these days; he is up against a difficult proposition and has no commission or board of arbitration to help him out. His only joy lies in the fact that fuel cannot protest audibly, no matter how it is treated. Coal prices are out of sight and any kind of black dirt goes. Powerhouse organizations are still suffering from the disruption caused by the war, and the present labor is expensive, green and unskilled when compared to pre-war labor. Power-house equipment has depreciated and become obsolete because no money for maintenance or renewal has been available. Load curves are being affected and not always improved by attempts to lower outside operating costs.

The general manager calls up the power man and says, "Look here, in 1914 you operated on 3 lb. of coal per kilowatt-hour and now you use 4 or 5; get busy, for we haven't got the money." We haven't heard very much about the power superintendent's problem, although we have heard more than a few whispers about fuel prices and platform labor costs. He has not kicked or whined, but has gone ahead, "sawed wood" and produced power by any and every means at his disposal in spite of adverse conditions.

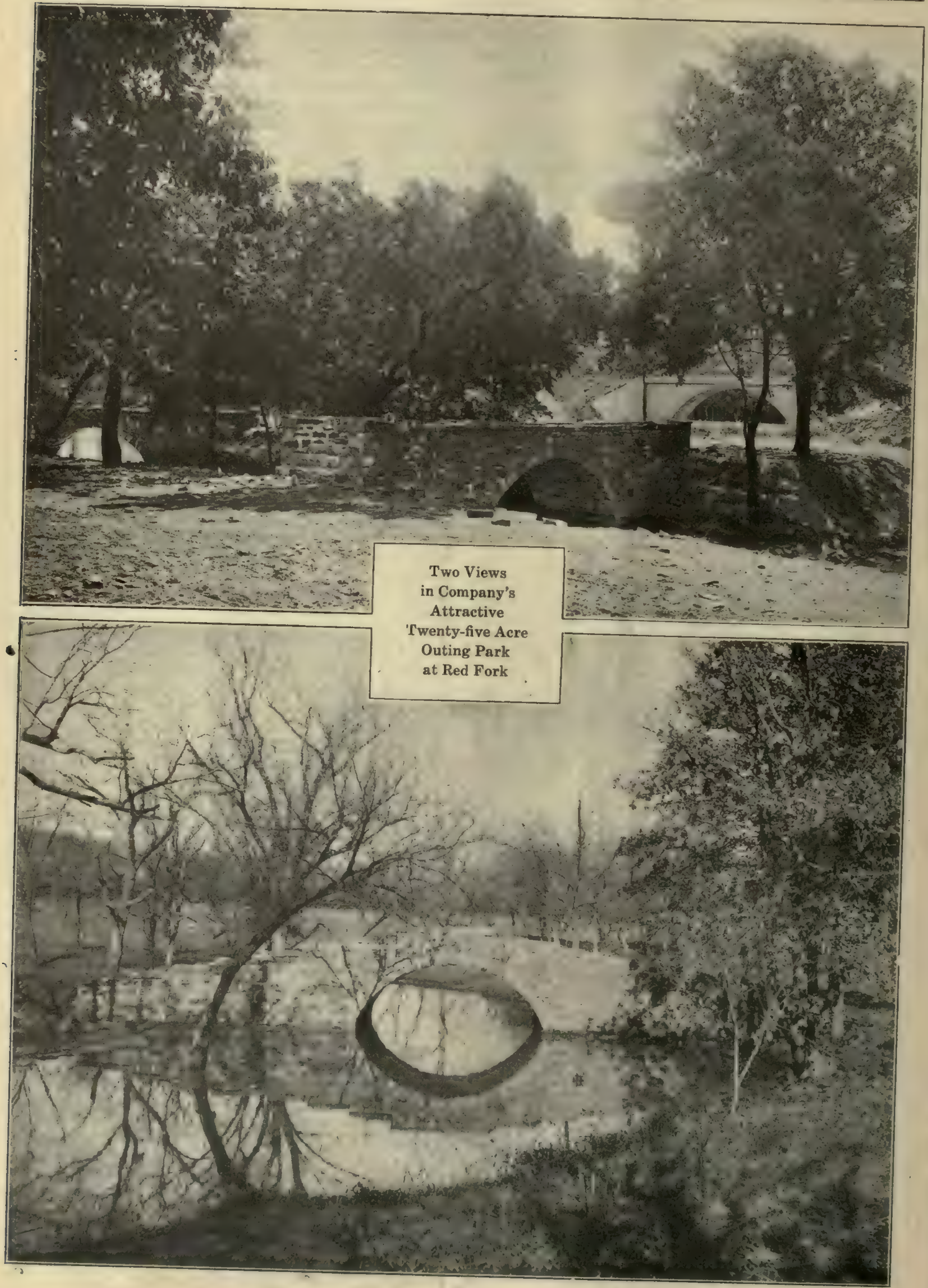
By way of contrast, think of the golden days of the past with $3 coal—real coal from one group of mines, clean, uniform and furnished on a B.t.u. basis; think of the skilled personnel and competent but cheap labor then available, of the comparatively new and well-maintained equipment. These good old times are gone, and we must adjust ourselves to the new conditions. Coal will never be back at the old figure, old equipment will never be new, the world-renowned American firemen and stationary engineers are being replaced by automatic machinery and unskilled foreign labor. These elements tend to make power more expensive and scarcer every day.

Nevertheless, cheap power in plenty is an essential to electric transportation. What can be done to insure it? Of course, concentrated power production in modern high-pressure plants, load-factor improvement through interconnection of systems, etc., are factors in the economic solution of the problem. Developments are occurring along lines that prove these elements to be the ultimate solution. But such things take time and money and we are facing existing conditions. Nevertheless, great improvements can be obtained right now in existing plants at an expenditure of a little time and a little money, and a dollar saved is a dollar earned, without dwelling on the fact that coal is difficult to obtain at any price.

In the first place there is opportunity for improvement in operating efficiencies. Poor but cheap coal, old equipment, automatic machinery and an unskilled but expensive personnel are elements that indicate the need for competent direction in power production. A combustion engineer with efficient auxiliary and control apparatus can therefore be of great value in a railway power plant: There is no longer any need for guesswork in steam production—any fuel can be burned in any equipment in the one proper manner through the application of engineering skill to existing apparatus, fuel and personnel. Put a competent combustion engineer in the boiler room, give him the necessary meters and control apparatus to enable him to care for the changing fuel and operating conditions and he will produce results and maintain efficient combustion conditions at all times with the existing equipment.

The power-plant superintendent can appreciably lower power costs through a more intensive study of the economies that can be obtained by properly scheduling and forcing boilers, by properly using and grouping existing turbines, engines and auxiliaries, by attempting to maintain a continuous economic heat balance and by intelligent interconnection with other power plants. He should have time and opportunity to study possible operating improvements in connection with steam production and utilization under existing conditions. If he can show that junking some equipment and installing new will pay a good return, he should be allowed to do it. If he wishes to remodel the auxiliary system or the excitation system to yield more economical results the management should permit such action. If stokers, automatic controls and regulators, new tubes, water and steam meters and new types of auxiliary apparatus are needed to enable him to know, not guess, how he is operating, he should have what he needs. Money spent thus may be as useful in lowering costs as in doing such other desirable things as buying safety cars, rerouting cars, adopting skip stops, using trailers, etc. Less money needs to be spent in the power house for beneficial financial results than in any other part of the system.

Railway managements have been so harassed by platform labor, financial and fare troubles recently that they have possibly been lax in their attention to the power plant during recent years. It is a managerial function to deal with all elements of cost, and the economic production of power under existing conditions requires broad vision and real engineering skill. Railways can neither afford to burn black diamonds ignorantly nor to throw away steam by inadequate use. Conditions change in the power plant as well as in the outside plant and what is, is not always right.



Two Views
in Company's
Attractive
Twenty-five Acre
Outing Park
at Red Fork

New Interurban Railway in Oklahoma

Serves Activities of Prosperous Oil Fields—Built Cross-Country, with 2-Deg. Curves and 1 per Cent Maximum Grade and Concrete Bridges Designed for Heavy Loads, Looking to Future Freight Business

THROUGH the center of the oil fields to the south of Tulsa, Okla., a new interurban property has been built and its operation is now well under way. It runs from Tulsa southwest through West Tulsa and Red Fork to Sapulpa, Okla., a distance of 14 miles, where it connects with the Sapulpa Electric Interurban Railway. This latter line runs from Sapulpa southeast through the old Glenn Pool oil field, which is almost a forest of derricks, to Kiefer, Okla., a distance of 5 miles. This older line is controlled by the same interests, and while the present service does not include through cars from Tulsa to Kiefer, this is contemplated for the future, and at present the cars of the two lines meet on regular schedule for transfer of through passengers at Sapulpa.

PROVISION IS MADE FOR CHILDREN, ALSO, IN THE PARK AT RED FORK AND A WELL-EQUIPPED PLAYGROUND IS A FEATURE

Tulsa is a flourishing city of some 80,000 people—a beautiful, almost entirely new city, whose inhabitants are nearly 100 per cent engaged in the oil industry, or are farmers who have been retired to ease and luxury through the good fortune of the discovery of oil on their own or adjacent land. Sapulpa is similarly an oil city, but in addition it is a division point of the Frisco Railroad and the home of several large glass works and other industries. It has a population of 18,000. Kiefer is a small town of 2,000 in the heart of the oil field, whose inhabitants are the real workers in the production of petroleum. There is plenty of ready money in these communities, particularly in Tulsa, the new interurban line herein discussed having been entirely financed by local people. No bonds were sold.

Construction of the new line between Tulsa and Sapulpa was begun in January, 1917, and first operation started in October, 1918, under the corporation name of the Oklahoma Union Railway, which had previously acquired the property of the Sapulpa Electric Interurban Railway between Sapulpa and Kiefer and the local lines in Tulsa of the Tulsa Traction Company, which has 4.2 single-track miles of line. The entire property comprises 27.2 single-track miles of line, all of which is now under the general management of R. V. Miller.

The need for the new line grew out of the activities in the oil fields, which demanded a frequent means of transportation between Tulsa and the oil fields to the south. Evidence of this demand is afforded in the accompanying table of gross earnings, which covers the total city and interurban lines, exclusive of the older Sapulpa-Kiefer line. For August, 1918, just prior to the inauguration of interurban service, the earnings for the city lines alone in Tulsa was $10,371. Comparing this figure with earnings for the entire company for the next few months will show in what manner the interurban contributed from the beginning to the total income. The number of car-miles operated on the city lines is about one-half of the total, though the income from the city lines is less than half the total. Taken by themselves, the interurban cars are earning a gross revenue averaging nearly $1 per car-mile. The figures shown in this table include an earning of about $100 a day made by an express car which makes one round trip a day between Kiefer and Tulsa and carries packages and miscellaneous freight. Express matter is carried on the regular passenger cars.

October, 1918	$16,283.22	September, 1919	$27,285.33
November, 1918	17,564.68	October, 1919	27,489.06
December, 1918	18,014.78	November, 1919	28,071.70
January, 1919	23,267.74	December, 1919	29,547.52
February, 1919	20,848.23	January, 1920	27,954.34
March, 1919	24,614.70	February, 1920	27,747.71
April, 1919	24,658.51	March, 1920	30,484.87
May, 1919	26,687.76	April, 1920	32,168.12
June, 1919	17,323.52	May, 1920	34,463.25
July, 1919	*9,384.34	June, 1920	33,075.92
August, 1919	25,588.16	July, 1920	34,898.40

* Strike of employees. Cars were kept running, but people were afraid to ride.

Contributing to these figures are the activities already referred to at Tulsa and Sapulpa and a good deal of oil industry along the line between these two towns. Immediately adjacent to the right-of-way is the plant of the Cosden Refining Company, the second largest refinery in the country, and other sizable plants of the Texas Company, Pan-American, Phœnix, Constantin and Mid-Continent oil companies and several other smaller companies.

CONSTRUCTION OF NEW INTERURBAN LINE

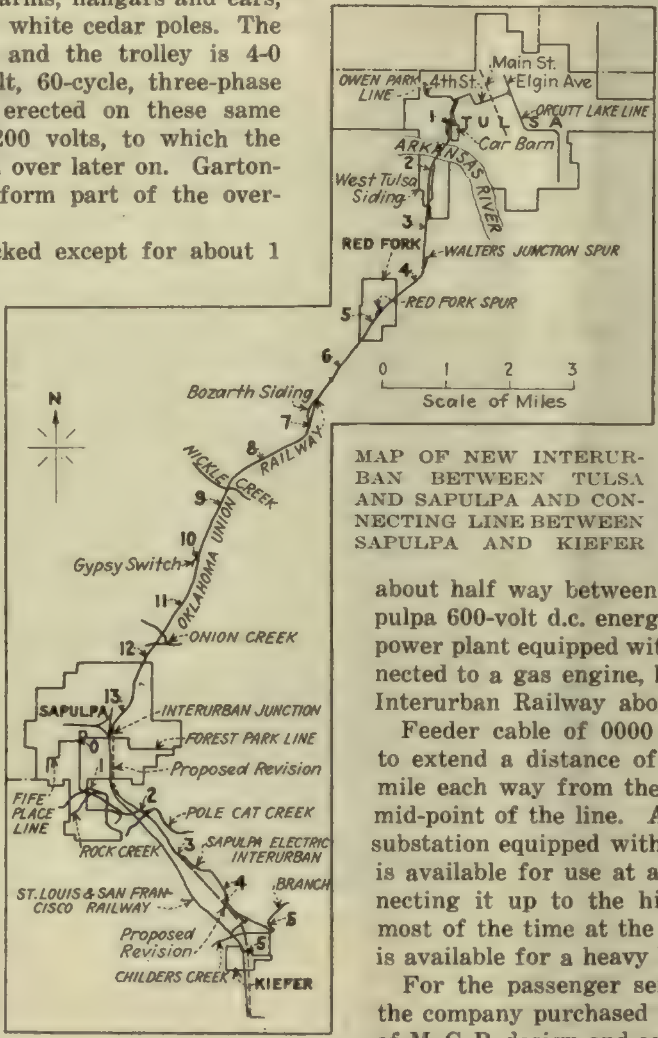
Beginning about ½ mile from the terminal in Tulsa, the new line is built on a cross-country right-of-way 100 ft. wide. The track was laid with 70-lb. A. S. C. E.

rail on 6-in. x 8-in. x 8-ft. Northern white cedar and white oak ties spaced on 2-ft. centers. The joints were completed with continuous joints and Ohio Brass acetylene-welded 4-0 bonds. To begin with, no ballasting was done except in low places.

The overhead trolley is of the bracket type construction, using Ohio Brass mast arms, hangars and ears, supported on 35-ft. Northern white cedar poles. The mast arms are 10 ft. long and the trolley is 4-0 grooved section. A 6,600-volt, 60-cycle, three-phase transmission line was also erected on these same poles and insulated for 13,200 volts, to which the line will probably be changed over later on. Garton-Daniels lightning arresters form part of the overhead equipment.

The road is all single-tracked except for about 1 mile of double track in Tulsa and West Tulsa. The roadbed has been graded and filled so that the maximum grade is 1 per cent outside of the cities, and the track is laid out for a maximum curvature of 2 deg. The building of the road required the construction of four bridges, three of them having 75-ft. spans and one a 40-ft. span. All of them are designed for Cooper's class E-40 loading for carrying heavy freight trains and are constructed of concrete, the frequent oil fires on the streams having made this permanent construction essential. All culverts up to 2 ft. in diameter were laid with vitrified pipe, while all requiring a larger opening were constructed with stone side walls and have a concrete slab spanning them.

Nachod signals protect a curved stretch of single track in Tulsa and a stretch over the Arkansas River bridge, also two highway crossings.



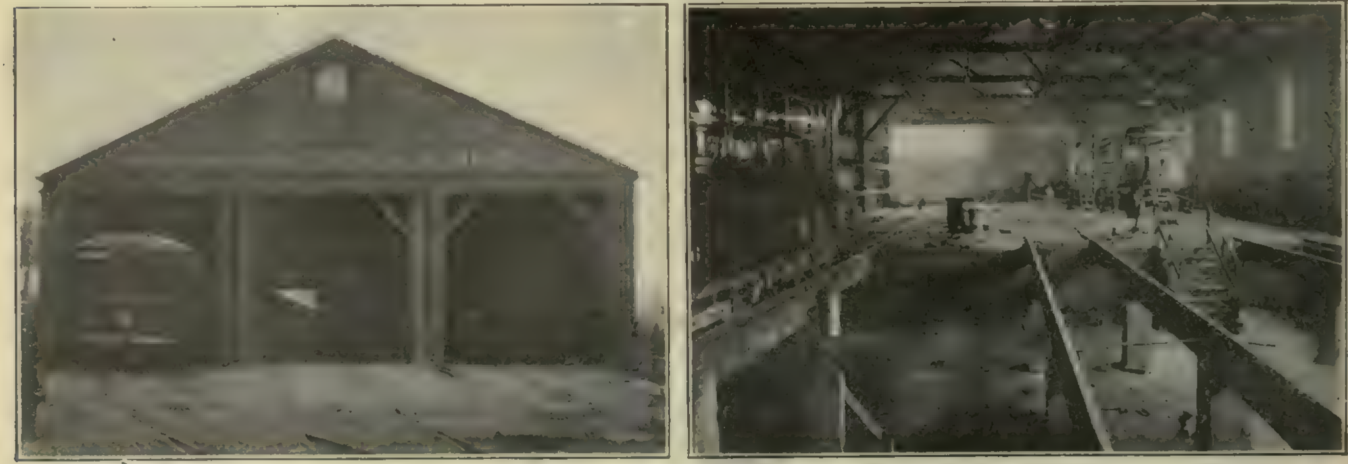
MAP OF NEW INTERURBAN BETWEEN TULSA AND SAPULPA AND CONNECTING LINE BETWEEN SAPULPA AND KIEFER

Near Tulsa a strip of the right-of-way about 2 miles long has been leased to the Midland Valley Railway for the purpose of installing a side track for tank cars to serve the Standard Oil Company's storage plant.

Power for operating the Oklahoma Union Railway is supplied from three sources. At Tulsa energy is purchased from the Public Service Company of Oklahoma, an Insull property, in the form of 600-volt direct-current energy supplied at the railway company's switchboard. At West Tulsa 6,600-volt, three-phase 60-cycle power is received from the Sand Springs plant of the Sand Springs Railway, 7 miles west of Tulsa, and is delivered over the O. U. R. company's high-tension line to an automatic substation equipped with one 300-kw. G. E. rotary converter and automatic equipment and situated about half way between Tulsa and Sapulpa. At Sapulpa 600-volt d.c. energy is received from a 300-kw. power plant equipped with a d.c. generator direct connected to a gas engine, built by the Sapulpa Electric Interurban Railway about nine years ago.

Feeder cable of 0000 and 00 sections is installed to extend a distance of 3 miles out of Tulsa and 1 mile each way from the automatic substation at the mid-point of the line. A manually operated portable substation equipped with one 300-kw. rotary converter is available for use at any point on the line by connecting it up to the high-tension line. It is used most of the time at the Sapulpa end of the line, but is available for a heavy load at any other point.

For the passenger service on the interurban line the company purchased three all-steel passenger cars of M. C. B. design and equipped with four G. E. 201-G, 65-hp. motors, G. E. type PC-5 multiple-unit control, Brill trucks and Westinghouse 18-ft. compressor and air-brakes. The car bodies are 56 ft. long over all and are built with a 9-ft. baggage compartment, a smoking



VIEWS OF THE SMALL SHOP BUILT IN THE OUTSKIRTS OF TULSA BY THE OKLAHOMA UNION RAILWAY TEMPORARILY TO TAKE CARE OF THE MAINTENANCE REQUIREMENTS OF THE COMPANY

AT LEFT, STANDARD BIRNEY SAFETY CAR, OF WHICH NINE ARE USED IN THE CITY SERVICE IN TULSA. AT RIGHT, PASSENGER CAR OF NEW OKLAHOMA INTERURBAN STANDING IN FRONT OF THE TULSA TERMINAL AND GENERAL OFFICES BUILDING

compartment and general passenger section, giving a total seating capacity of fifty. The trucks are mounted on 32-ft. centers and equipped with 36-in. Davis wheels. The cars complete weigh 31 tons. There is also one express car, which is likewise of all-steel construction and equipped with the same types of motors, control, air brakes and other equipment as the passenger cars.

Two of the passenger cars are required to give the hourly service betwen Tulsa and Sapulpa. The running time each way is forty-five minutes, and the cars leave each city on the hour, giving a short layover at each end of the line. The time required to go from Tulsa to Kiefer now, with the transfer at Sapulpa, is one hour and thirty minutes, but with the line ballasted and through service installed it is expected that this run will be made in one hour. Like the newly constructed line, the old section of line between Sapulpa and Kiefer is on private right-of-way except for about 1 mile through the main streets of Sapulpa.

The cars on the new line are dispatched from Tulsa, where the duties of the dispatcher and ticket agent are combined in one job. The dispatching is handled through the installation of a Western Electric Company railway telephone system with a telephone jack installed every ½ mile on the line and an instrument on each car.

The city service in Tulsa is now supplied with nine standard safety cars, six of which are required in the regular schedule. These operate on a fifteen-minute headway. In addition there are two double-truck cars equipped with the Westinghouse Traction Brake Company safety devices and four G. E.-258 motors which provide a fifteen-minute service to West Tulsa and a thirty-minute service to Red Fork, a town of some 600 population situated on the interurban line 4½ miles south of Tulsa. These double-truck safety cars seat sixty people and weigh 28,000 lb. They are operated by two men, with front entrance and exit, and the fares are collected within the car on account of the different denominations required for the different lengths of ride. They are arranged for double-end operation and the door openings made wide to expedite loading and unloading in the downtown section.

DOUBLE-HEAD CARS DURING RUSH HOURS

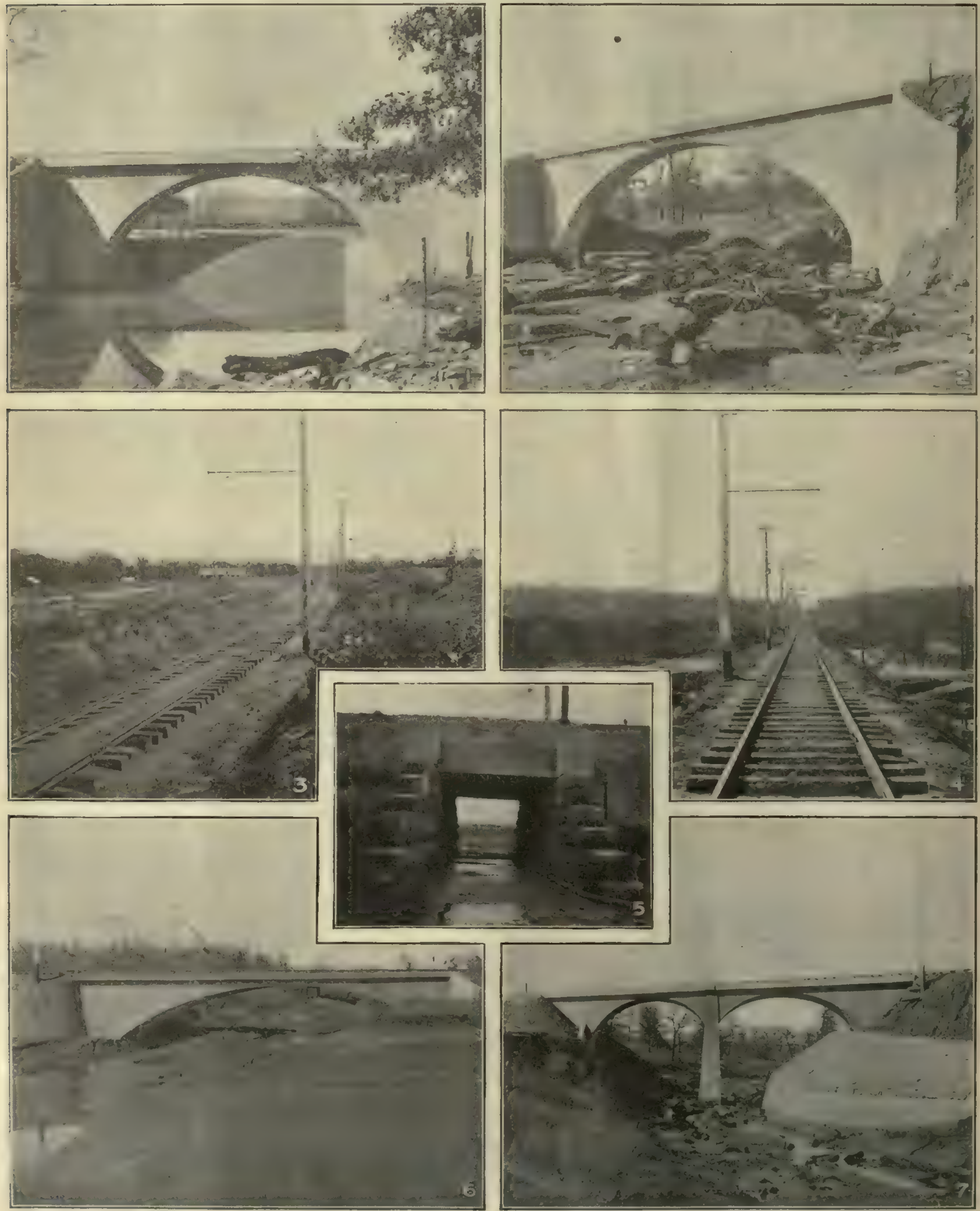
On account of the interurban and suburban service operating over the same single track at the Tulsa end of the interurban property, it is necessary to double-head the cars during the rush hours, for the interval cannot be reduced without double-tracking the line. This character of operation has made highly acceptable the counting feature of the Nachod signals protecting dangerous sections of the line over which both interurban and city cars must operate.

At Red Fork the company owns 60 acres of land, of which 25 acres have been set aside and partially improved for a recreation park. Adjacent to this park it is planned at some future time to build a shop which will be adequate to take care of the entire maintenance requirements of the system. For the present a small shop, pictures of which accompany this article, has been

AUTOMATIC SUBSTATION EQUIPPED WITH ONE 300-KW. ROTARY AND INSTALLED HALF WAY BETWEEN TULSA AND SAPULPA

PORTABLE SUBSTATION HOUSING ONE 300-KW. ROTARY CONVERTER FOR EMERGENCY USE ON OKLAHOMA UNION RAILWAY

The Structures Along the Right-of-Way Present Many Interesting Features



Numbers 1, 2, 6 and 7—Concrete bridges along right-of-way, original permanent construction being necessary on account of oil fires on streams. Numbers 3 and 4—Roadbed and overhead construction, with telephone wires and provision for high-tension line on same poles. Number 5—Standard culvert construction, where opening required exceeded 2 ft.

TROLLEY CONTACTOR SIGNAL INSTALLATION TO PROTECT MOVEMENT ON THE SINGLE TRACK OVER THE ARKANSAS RIVER BRIDGE

DOUBLE-TRUCK SAFETY CAR USED IN SUBURBAN SERVICE BETWEEN TULSA AND WEST TULSA AND RED FORK

built in the outskirts of Tulsa and equipped with a wheel lathe, drill press and a few other machines, so that the company is enabled to take care of its own maintenance of equipment except for that work which requires a wheel press. The pit capacity permits work on three large cars or six safety cars at one time.

The very rapid development of the territory in this section of Oklahoma has led to the serious consideration of extending the interurban line to Beggs and Okmulgee, about 25 miles from Kiefer. However, this extension will not be built so long as present prices prevail.

Swiss Dynamometer Car

THE use of dynamometer cars in connection with trunk line electrification is advocated by the Swiss State Railways. The need for reliable determination of train speed, drawbar pull, brake performance, etc., was appreciated and a car was designed to meet the requirements. This car is described in the *Railway Engineer* for May, 1920. It is 57 ft. long over all and weighs about 37 tons completely equipped. The car body rests on two four-wheeled bogie trucks of standard design with an exceptionally strong underframe with double side sills. The interior of the car is divided into four compartments. The first, in front, is 21 ft. long and is the test room which contains all indicators and measuring apparatus. The second compartment is a workroom, 13 ft. long, which gives access to a small corridor. This reaches the room on the back platform, containing an outfit for making running repairs, a workbench with chemical apparatus and lockers for supplies.

Westinghouse air brakes are provided on the wheels of three truck axles only, as the rear axle of the front truck is used to transmit the car motion to the measuring devices.

A hydraulic dynamometer was used instead of the spring type usually encountered, as the springs of the latter are cumbersome and difficult to calibrate when used for large dynamometers. The hydraulic dynamometer is of the usual principle, but was modified in many ways. For instance, the cylinders and pistons were so accurately ground that all packing and stuffing boxes were omitted and friction was reduced by using oil film lubrication. In this dynamometer there are two rams of polished steel projecting into two cylinders, which open outward on opposite faces of a single block of forged steel. The pressure exerted on the rear piston is given by the tractive effort of the engine, while the front piston receives the braking effect as felt on the bumpers. The pressure in the dynamometer cylinders is transmitted by pipes to a pair of small recording cylinders arranged in tandem, with the piston ends extending opposite to each other. The pressure acts on two differential pistons, permitting the use of either of two piston areas, depending on the setting of the distributing valve. A calibrated helical spring is located between the two pistons and the amount of its compression indicates the load acting on the small pistons. Then, when the ratio of these piston areas to the area of the dynamometer pistons is known the drawbar pull or braking load is readily determined.

A special type of tachometer is used on the car which continuously records the train speed. It is so sensitive that practically no time elapses between a change of speed and the action of the instrument. Among other special devices used are the ergometer, for determining the inertia forces and work done in overcoming train mass, omitting air and frictional resistance; a drawbar-pull meter, which works on the same principle as the ergometer; a horsepower meter, for getting the drawbar horsepower; a Kapteyn apparatus, for determining brake performance, and a special device for "indicating" the cylinders of a steam locomotive when the car is used for steam locomotive testing.

All of the apparatus and registering devices are mounted on a cast-iron table 69 in. x 35 in. and all the records are made on a continuous chart, using paper rolls about 2 ft. wide. This car is used on all the steam and electric lines and has proved to be very satisfactory.

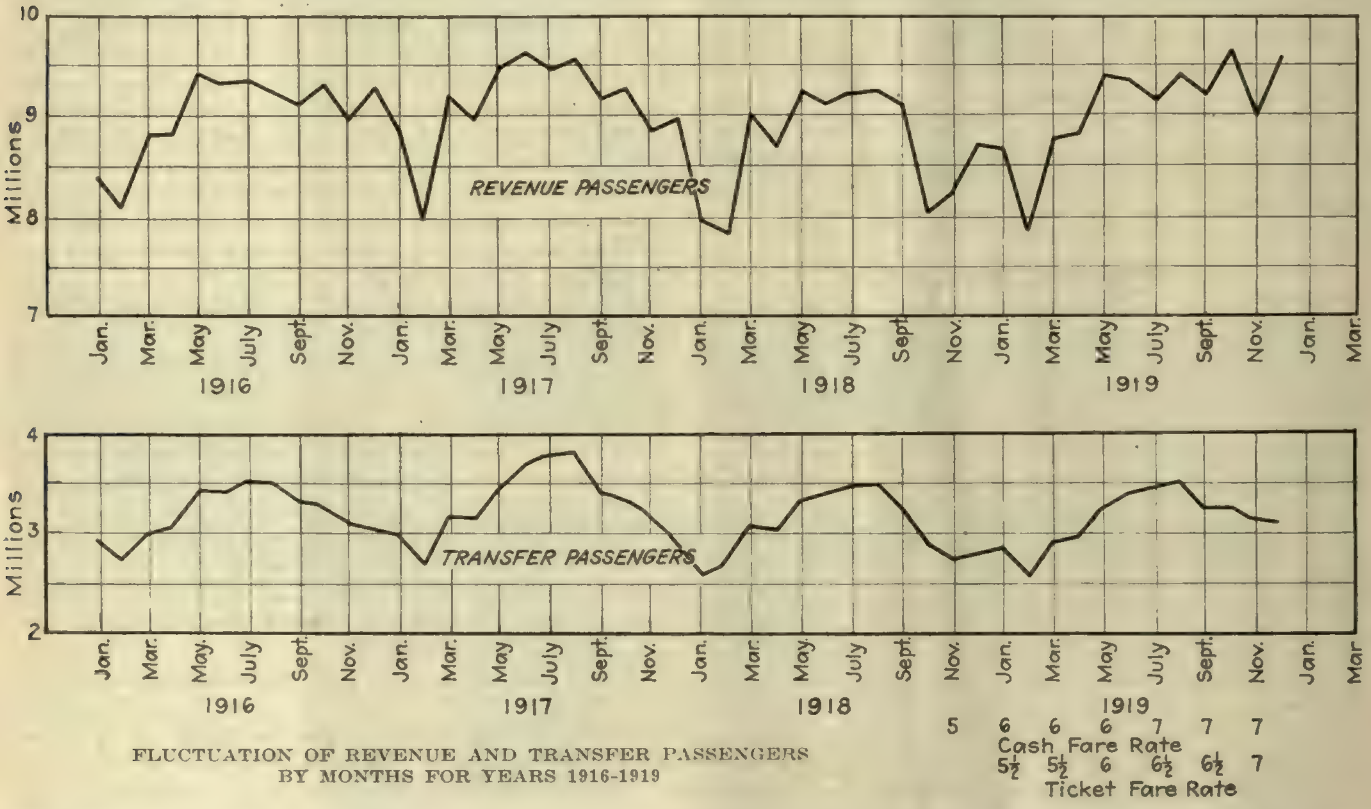
Stimulating Freight Car Movement

"MORE Transportation" is the title of a bulletin now being issued by the Association of Railway Executives, the first number being dated Aug. 20. The advisory committee of the association, of which Daniel Willard is chairman, has set for its goal in the improvement of transportation service the following definite ends: (1) An average daily minimum movement of freight cars of not less than 30 miles; (2) an average loading of 30 tons per car; (3) reduction of bad-order cars to a maximum of 4 per cent of total owned; (4) an early and substantial reduction in the number of locomotives now unfit for service; (5) the making of more effective efforts to bring about the return of cars to the owner roads.

Cincinnati Director Reports

First Annual Report Under the New Service-at-Cost Franchise Gives Opportunity to Analyze the Effect of Many Items—Some Faults of Present Franchise Show Up

THE Director of Street Railways of the city of Cincinnati, W. C. Culkins, has just issued his report for the year 1919. This is the first full year under the Cincinnati service-at-cost franchise and also the first complete year following the World War.



FLUCTUATION OF REVENUE AND TRANSFER PASSENGERS BY MONTHS FOR YEARS 1916-1919

One of the problems of the year was the elimination of what Mr. Culkins calls the "inadequate and uncomfortable type of box car operated on many lines." The question in Cincinnati is complicated by the inclined planes and certain heavy grades over which the cars must operate, the company holding that no larger type could be used, but the Department of Street Railways does not agree. After a consideration of the question, agreement was made on the adoption of a type of four-motor, double-truck equipment and the purchase of one hundred and five new cars of this type. One element of this consideration was that the maximum operation of small cars had been reached on some lines and the service was still inadequate.

Elimination of some serious grades, such as the Milton Street hill, having a grade of nearly 12 per cent, was one of the problems of the year, and it was finally decided to widen Liberty Street in order that double tracks be laid there and the use of Milton Street avoided.

Efforts of the department have also been directed to improving the power supply conditions. Low voltage in some of the outer zones of many of the long lines resulted in slow movement of cars, with consequent delay. Solution of this problem is expected in 1920.

The report outlined the work which was done on extensions during the year. One extension, referred to the department by the City Council, was disapproved against because it would probably result in a net loss of all the cost of its operation.

The effect of fare changes is one of the interesting items of the report. The first two months created a deficit and under the terms of the service-at-cost franchise this necessitated a change in rates. Each subsequent two months' period, that being the length of the test period in each case, failed to show the necessary gain, and consequently there were periodical fare changes. Mr. Culkins states that the mistake was made in putting the fare too low to start with, but this was set at 5 cents upon the urging of a committee of citizens, even though a deficit was expected. Although the next two months' period indicated that receipts were entirely inadequate, it was impossible to adjust the fare to a satisfactory figure because under the terms of the franchise the only adjustment which can be made is to go to the next higher fare.

Contributing to the other elements which tended to make the income from the rates of fare used ineffective were the decisions of the War Labor Board increasing the wages of conductors and motormen and shortening the time limit in which the maximum rate of pay should be reached from five years to two years. Coal prices also rose and certain track relaying was called for, all of which increased expenses. Each step in fare which was made to meet increases in costs was followed by further increases in cost of certain items.

The following table shows the effect of varying conditions upon the income and cost of service per revenue passenger:

	Total Income	Cost of Service	Surplus or Deficit
October, 1918	5.11	6.56	—1.45
November	5.13	6.20	—1.07
December	5.11	6.76	—1.65
January, 1919	5.75	6.96	—1.21
February	5.69	6.99	—1.30
March	5.63	6.89	—1.26
April	6.09	6.84	— .75
May	6.09	6.56	— .47
June	6.10	7.22	—1.12
July	6.71	7.27	— .56
August	6.76	7.09	— .33
September	6.74	7.05	— .31
October	7.04	6.79	.25
November	7.03	7.02	.01
December	7.08	7.07	.01

The average fare per revenue passenger for the year was 6.28, as compared with 4.98 in 1918, and the average for all passengers was 4.67, as compared with 3.71 in 1918. Under the 7-cent rate the average in December was 6.92 per revenue passenger and the average per passenger, including all passengers, was 5.23.

For two periods of three months each there was a saving of ½ cent made by the purchase of tickets. There were two similar periods, in which no discount was obtained by the purchase of tickets, and this situation afforded an unusual opportunity to study the public tendency in this regard. The ratio of cash fares and tickets throughout the year was as follows:

	Cash Fares		Ticket Fares	
	Rate	per Cent to Total	Rate	per Cent to Total
January, 1919	6 cents	18.62	5½ cents	81.38
February	6 cents	18.86	5½ cents	81.14
March	6 cents	24.17	5½ cents	75.83
April	6 cents	77.53	6 cents	22.47
May	6 cents	82.28	6 cents	17.72
June	6 cents	86.67	6 cents	13.33
July	7 cents	31.63	6½ cents	68.37
August	7 cents	30.83	6½ cents	69.17
September	7 cents	32.33	6½ cents	67.67
October	7 cents	74.96	7 cents	25.04
November	7 cents	76.66	7 cents	23.34
December	7 cents	78.32	7 cents	21.68
Twelve months average	6½ cents	53.54	6¼ cents	46.46

To attempt a direct answer to the question, "What has become of the money produced by the increase in fare?" he gives the following table to show the increase in earnings and increase in expense in 1919 as compared with 1916:

Increase in earnings	$1,531,505.25		
Increase in total income	1,578,620.09		or 26.52 per cent
Increase in expenses—wages and salaries		$1,485,794.55	or 66.54 per cent
Increase in materials and supplies		271,570.11	or 100.27 per cent
Increase in coal		222,816.01	or 73.21 per cent
Increase in valuation expenses		20,710.17	or 100.00 per cent
Increase in depreciation		35,000.00	or 26.52 per cent
Increase in insurance		10,302.02	or 37.77 per cent
Increase in other expenses		49,092.73	or 28.27 per cent
Total increase		$2,095,285.59	or 66.70 per cent

In addition, general taxes increased $152,726.97, or 37.46 per cent; taxes for city of Cincinnati and Norwood increased $17,451.92, or 5.15 per cent. Since the total expenses exceeded receipts, the company was compelled to borrow and became liable for interest charges amounting to $57,464.69, an increase of 100 per cent, since there was no similar charge in 1916. The story in three lines is this:

		Per Cent of Increase	Ratio to Income
Increased income over 1916 from increased fare and all other sources	$1,578,620.09	26.52	100 per cent
Increases in expenses over 1916	$2,328,562.50	45.14	147.51 per cent
Excess of increase in expenses over increase in income	$749,942.41		47.51 per cent

At the end of the year 1919 there was an accumulated deficiency of $1,669,567.35 in unpaid obligations and moneys owed to the bank. The provisions of the franchise require that fares be increased successively until gross receipts provide for cost of service and all accumulated deficits are paid. Notwithstanding the fact that for three months the 7-cent fare produced the current cost of service, further increases would be necessary to pay off deficiencies for previous months and years, and this alone would require increases by successive stages to 9½ cents.*

It was, therefore, decided that it would be fair to the public to fund deficits by issuing securities which would be amortized in a period of years at a rate which could be absorbed by the current operation of the company.

Authority was, therefore, granted by the Public Utilities Commission of the State and the Director of Street Railways to issue $4,650,000 in bonds bearing 6½ per cent to be sold at not less than 95 per cent, and also $2,100,000 in 6 per cent debenture notes, each maturing in twenty-five years, a sinking fund being provided to meet these maturities. But even these issues were impossible to market and the plan was modified so that there were issued $2,250,000 of three-year notes bearing 7 per cent interest sold at 96½ and $2,250,000 debenture notes, bearing 6 per cent, in lieu of the accrued dividends and payments allowed to the stockholders under the ordinance and to provide the initial $250,000 of the reserve fund. The company was also permitted to sell an additional $1,500,000 of three-year notes to provide for improvement on the property, and further $1,250,000 of 6 per cent equipment notes for the purchase of additional cars.

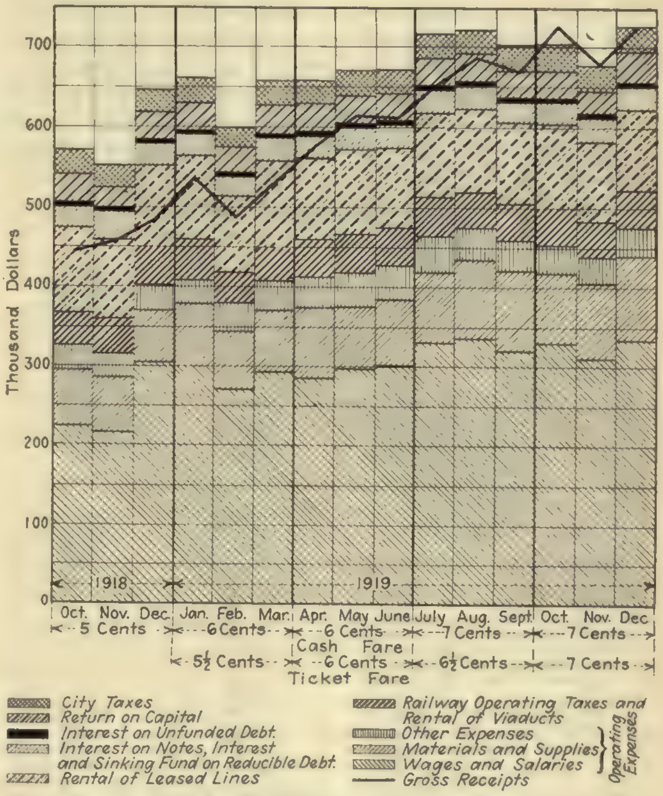


CHART SHOWING ANALYSIS OF COST OF SERVICE AND ITS RELATION TO GROSS RECEIPTS FROM OCT. 1, 1918 TO DEC. 31, 1919

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*The present fare is 8 cents cash, 7½ cents ticket.—EDITORS.

Another interesting opportunity for study was the effect of increased fares upon the car-riding habit. Mr. Culkins concludes that there seems to be no considerable number of passengers who were influenced to walk short distances, because the percentage of increase and gross receipts in each case was greater than the percentage of increase in fares. Apparently the rate of fare has had little, if any, effect upon the number of passengers. The trend of traffic, however, did not show the increase that has been found in other cities, but this is not difficult to understand when it is realized that the late census shows Cincinnati not to have grown as did other cities.

The following table shows the number of revenue passengers for the last four years:

1916	116,599,800 revenue passengers	1918	112,525,698 revenue passengers
1917	118,152,860 revenue passengers	1919	117,495,936 revenue passengers

Density of traffic is of course a large item in the cost of service. Cincinnati, by reason of the long hauls through sparsely settled territory, has a very low density of traffic as compared with other cities. The standard of service furnished in Cincinnati in 1919 was .184 car-miles per revenue passenger. Comparing Cincinnati's density of traffic with other cities, he finds the following, the figures indicating passengers per car-mile:

Cleveland	8.73	Kansas City	4.94
Detroit	7.41	St. Louis	5.98
Boston	5.95	Cincinnati	5.55
Baltimore	6.83		

Mr. Culkins also analyzes the cost of labor, material and coal. Bringing the labor figures to a table, the results are about as follows:

Year	Minimum Rate per Hour Cents	Maximum Rate per Hour Cents
1901-1906	19	21
1907-1909	20	22
1910-1913	20	25
1914-	20	27
1914-1915	20	27
1915-1916	20	27
1916-1917	23	30
1917-1918	24	30
1918-part	26	32
1918-(latter part)	31	37
Nov., 1918, to June, 1919	43	48
July 1, 1919, to date	45	50

The following table of material increases will be of particular interest:

Material		1914	1915	1916	1917	1918	1919
Iron poles (line) 6 in.x7 in.x30ft.	Each	$20.70	$20.70	$27.60	$55.20	$41 40	$48.30
Wood poles (line) 8 in.x35 ft.	Each	6.80	6.80	6.80	7.60	11.55	13.86
Steam pipe	%*	78.00	77 00	74.11	42.30	42.30	49.11
Fittings	%*	60.00	60.00	60.00	List	List	10 00
Rails	Ton	38.10	38.10	38.10	69.30	69.30	64.70
Switches	Each	164.00	164.00	164.00	284.00	284.00	375.00
Mates	Each	109.00	109.00	109.00	198.00	198.00	225.00
Ties	Each	.70	.67	.67	.78	1.00	1.30
Cement	Barrel	1.73	1.69	1.84	2.09	2.79	2.90
Sand	Ton	.50	.50	.50	.70	1.20	1.15
Gravel	Ton	.60	.60	.60	.90	1.40	1.15
Track bolts	Cwt.	2.05	2.34	2.20	5.55	5.55	4.88
Cast iron wheels	Cwt.	1.42	1.42	1.42	1.52	2.50	3.19
Brake shoes	Ton	28.00	28.00	28.00	31.65	74.50	65.00
Axles	Cwt.	3.50	3.50	3.50	6.00	7.00	6.00
Trolley rope	Pound	.20	.19	.26	.35	6.47	.62
Bell cord, ½ in.	M. ft.	13.75	13.75	13.75	27.50	30.60	32.42
Manila rope	Pound	.12½	.14½	.18	.26	.33	.35
Dry batteries	100	14.50	14.50	14.50	28.70	28.85	33.05
Gears—W. H. No. 92	Each	23.05	22.50	22.50	36.45	43.15	42 50
Armature coils	Set	27 50	33 20	30.35	51.70	51.70	35.00

*Figures given are per cent discount from list prices.

One of the efforts of the department is to maintain service and to allow the service-at-cost principles of the franchise to work to repay the company, along the proper lines.

The standard adopted is based upon the principle that during the non-rush hours there should be supplied during each half hour as many seats as there are passengers in that period and during the rush-hour period, from 6 to 9 a.m. and 4:30 to 6:30 p.m., there shall be a sufficient number of cars to provide 4 sq.ft. of floor space for each standing passenger during each fifteen-minute period. The department made forty-three careful checks of service and traffic at given points and fifteen platform checks. The information thus obtained furnished the basis of various improvements in the service. Mr. Culkins gives a rather complete survey of the results of these inspections on each of the lines in the city and from this shows up the necessity of increased or better distributed service on these various lines. He then makes recommendations with reference to relief in many parts of the city.

With reference to rail, he states that the custom in Cincinnati has been to require grooved rails in all kinds of track construction, but that inquiry shows where the "T" rail had been used the engineers of the cities and companies favored it strongly and where it had never been used there was strong opposition. In some places the department has been able to get agreements, to a limited extent, for the use of the "T" rail in Cincinnati.

NEW FRANCHISE AUTHORIZES FREIGHT HAULING

With reference to freight hauling, it is stated that the new franchise authorizes the use of tracks and equipment for hauling of freight and express matter, but that not much progress had been made with the subject in Cincinnati during the past year. It is believed, however, that it offers an opportunity for additional earnings, which, under the ordinance, would be of immense benefit to the car-riding public.

In connection with the accident record of the company, satisfactory progress is being made in reducing the number of accidents and the seriousness of the accident account. Complete statistics of the accident record for the year 1919 and also the two previous years are given in the report. Another table shows that the percentage of injuries and damages totaled 2.13 of the total passenger earnings for 1919, whereas in 1914 the percentage has been 3.10. The statistics also indicate that during the skip-stop régime the accidents were lower than before this skip-stop was inaugurated and also lower than after the skip-stop was discontinued.

The report also includes an analysis of car inspections, defect reports, supervision of accounts and many financial items, as well as a résumé of suggestions and recommendations made by the director during the year; also discussions of the probable replacement of the double trolley system with the present heavy cars by one-man cars, with single trolley.

Other points covered were traffic congestion, cleaning and ventilating of cars, the suggestion of a standard parade route and regulations to give minimum interference with street traffic, fare boxes, departmental expenses, and the interurban situation with respect to city terminal facilities.

The report closes with a discussion of the service-at-cost franchise, parts of which have already been included in the abstract, and a comparative statement of revenues, expenses and incomes, details of operating expenses and other financial analyses.

Accidents Lessened by Safety Cars

Statistics from Group of Stone & Webster Properties in Widely Separated Sections of Country Show Accidents on Basis of Car-Mile or Passengers Carried Far Less with Safety Cars Than with Two-Man Cars—Other Statistics Given

BY W. H. BURKE

FROM time to time some of the newspapers have given considerable publicity to a few more or less minor street railway accidents in which the safety or one-man car has happened to be involved. In most cases these accounts have not been unfriendly to the car. The press in general has been among the first to see the tremendous advantages which the safety car has over the older type of rolling stock in the way of faster and more frequent service. Hence it is clear that any exaggerated impression of the accident hazard which these newspaper reports may have conveyed has been the result of a misunderstanding of the facts in the situation and that they were not in any sense prompted by a feeling of hostility. Nevertheless, in many cases they have laid a great deal more stress on the one-man feature of the car than the importance of the particular accident or the circumstances surrounding its occurrence would warrant.

In the early days of the safety car it was not unnatural for the layman to feel that there was an inherent accident hazard in a car operated by one man which would not be present in a two-man operated car. The safety car was an entirely new departure, and naturally the public did not understand its mechanism nor the fact that the safety features embodied in its design, with the added advantage of responsibility for its operation being lodged with one man instead of two, were bound materially to reduce the accident hazard rather than increase it. Unfortunately, however, there were no tangible results or actual figures available in the early days to prove this, and in the circumstances it is remarkable that practically no popular opposition developed on this score.

The answer is to be found, of course, in the appeal which the car immediately made to the public on account of the faster and more frequent service which it made possible. Its popularity is best evidenced by the fact that, although it was not developed on a commercial scale until late in 1916, more than 5,000 safety cars were in use or on order by the end of May this year, and this number of course is considerably greater at the present time. One of the large car builders is authority for the statement that more than 75 per cent of all the cars purchased in 1919 by the electric railways of the United States were of the safety type. Furthermore, this record has been made in the face of the most serious financial conditions which have ever confronted the street railway industry.

Practically all of the Public Service Commissions which have passed on the matter have indorsed the car, and in at least one recent case a commission criticised the management of a large Western property for not having taken advantage of the safety car and the economies in operation which it makes possible.

The simplicity of the car's operation is evidenced by the fact that in one Middle Western city, where the Birney safety car is used exclusively, the service was operated entirely by women during the war and with wholly satisfactory results from an accident as well as from every other standpoint.

ROADS SELECTED FOR COMPARISON

In spite of the fact that the car has already sold itself to the public and is now generally accepted as the greatest advance step in street railway transportation since the electric railway motor was first developed, it is worth while to consider the actual results which have been achieved from an accident standpoint, if for no other reason than to vindicate the judgment of the early advocates of the safety car idea. With this thought in mind a careful analysis has been made of the accident records of thirteen representative street railway companies covering the first five months of the current year.

All of these companies are under Stone & Webster management and are widely scattered, their geographical location being as follows:

Texas	4	Iowa	1
Washington	3	Kentucky	1
Florida	1	Louisiana	1
Georgia	1	Canada	1

These thirteen companies serve a combined population of about 1,000,000 people and during the period in question operated more than 12,000,000 car-miles and carried more than 70,000,000 passengers, exclusive of those using transfers. The safety cars in these cities are operating under all kinds of conditions as regards street and traffic congestion, and in at least two of the cities this congestion is as serious in sections of the business district during rush hours as will be found anywhere in the country. As of May 31, these companies owned approximately 400 cars equipped for one-man operation.

It should be stated further that the figures used herein are not for any group of especially selected companies, nor are they for certain selected lines of any particular companies. On the contrary, they include all of the companies under Stone & Webster management where any appreciable number of safety cars are being operated.

These facts are set out to show that the data given are representative, and if the accident record of the safety car as compared with the ordinary two-man car is favorable under these circumstances it would seem to be pretty conclusive proof that from an accident standpoint alone, and entirely aside from its many other advantages, the car has vindicated the judgment of its many advocates; also that it is reasonable to expect similar average results on any other street railway property as far as the accident situation is concerned.

The summary in Table I shows the passenger car mileage and passengers carried (excluding transfers) divided as between safety and two-man cars. These

TABLE I—CAR-MILES AND PASSENGERS CARRIED ON SELECTED GROUP OF THIRTEEN STONE & WEBSTER PROPERTIES, FIRST FIVE MONTHS OF 1920

	Passenger Car-Miles Operated		Passengers Carried (Transfers Excluded)	
	Safety Car	Two-Man Car	Safety Car	Two-Man Car
Baton Rouge, La.*	120,700	0	1,006,700	0
Beaumont, Tex.	325,000	192,700	1,439,600	1,537,800
Bellingham, Wash.	379,500	58,800	1,467,000	256,300
Columbus, Ga.	240,200	167,600	1,107,300	1,192,100
El Paso, Tex.	736,700	478,000	3,731,300	3,140,200
Everett, Wash.	352,900	15,200	1,821,600	213,200
Fort Worth, Tex.	924,600	1,407,500	5,037,900	10,715,400
Halifax, N. S.	134,400	631,500	947,100	4,618,000
Houston, Tex.	731,300	1,616,800	3,625,200	11,595,300
Keokuk, Iowa*	109,700	0	508,900	0
Paducah, Ky.*	259,400	0	1,036,300	0
Tacoma, Wash.	952,700	953,800	4,035,700	5,122,500
Tampa, Fla.	685,600	557,400	3,407,900	3,222,400
Total	5,962,700	6.079,300	29,172,500	41,613,200
Per cent of total	49.5	50.5	41.2	58.8

* 100 per cent safety-car operation.

TABLE III—ACCIDENTS CLASSIFIED AS "IMPORTANT" PER 200,000 PASSENGERS ON THIRTEEN SELECTED PROPERTIES DURING FIRST FIVE MONTHS OF 1920

		Number Important Accidents per 200,000 Passengers (Transfers Excluded)	
		Safety	Two-Man
1	Collisions with pedestrians	0.14	0.18
2	Collisions at railroad crossings (other than company's)	0.01	0
3	Collisions between cars of company	0.12	0.12
4a	Collisions with automobiles	1.22	0.74
4b	Collisions with other vehicles	0.09	0.10
4c	Collisions with animals	0.03	0.03
5	Derailments	0.06	0.06
6	Equipment	0.01	0.06
7	Boarding cars	0.02	0.25
8	Injuries on cars	0.11	0.20
9	Alighting from cars	0.17	0.57
10	Falling from cars (not purposely alighting)	0.01	0.01
11	Stealing rides	0.01	0.01
12	Doors, gates and guards	0.04	0.04
13	Miscellaneous	0.22	0.34
		2.26	2.71

figures are reproduced merely to emphasize the widely varying conditions under which the safety car is being operated on the thirteen properties under consideration.

ACCIDENTS, TOTAL AND PER 200,000 PASSENGERS, COMPARED

In reporting accidents all of these companies use the classification of "accidents and occurrences" adopted at the 1916 convention of the American Electric Railway Association. Under this head is included every accident or happening on which an accident report is turned in. These, in turn, are segregated as between "important" and "trivial." Accidents reported as "trivial" are those where there is no injury or damage, or where the injury or damage is very small. Generally speaking, "trivial" accidents cover those where there appears to be no liability on the part of the company and which would hardly be considered important enough to report except as a matter of protection in case a claim should later result. All accidents other than "trivial" are classified as "important." A similar plan is followed in classifying personal injuries.

The total number of "important" accidents on all of the properties segregated as between safety and two-man cars and the number per 50,000 car-miles operated by each type of car were, for the first five months of 1920, as shown in Table II.

These figures show that on a car-mile basis the average number of accidents for the two-man car is substantially 70 per cent greater than for the safety car. Except for collisions with automobiles, where the figure for the two-man car is somewhat lower, the comparison is overwhelmingly in favor of the safety car. Furthermore, even in the matter of collisions, the showing favors the safety car slightly when collisions of all kinds are considered (Items 1 to 4c inclusive), the number per 50,000 car-miles being 1.95 for the safety car and 1.99 for the two-man car.

TABLE II—ACCIDENTS CLASSIFIED AS "IMPORTANT" ON THIRTEEN SELECTED PROPERTIES DURING FIRST FIVE MONTHS OF 1920

		Total Number		Number per 50,000 Car-Miles	
		Safety	Two-Man	Safety	Two-Man
1	Collisions with pedestrians	20	37	0.17	0.30
2	Collisions at railroad crossings (other than company's)	1	0	0.01	0
3	Collisions between cars of company	17	24	0.14	0.20
4a	Collisions with automobiles	178	154	1.49	1.27
4b	Collisions with vehicles	14	21	0.11	0.17
4c	Collisions with animals	4	6	0.03	0.05
5	Derailments	9	12	0.08	0.10
6	Equipment	2	12	0.02	0.10
7	Boarding cars	3	52	0.03	0.43
8	Injuries on cars	16	41	0.13	0.34
9	Alighting from cars	25	120	0.21	0.99
10	Falling from cars (not purposely alighting)	1	3	0.01	0.02
11	Stealing rides	1	2	0.01	0.02
12	Doors, gates and guards	6	9	0.05	0.07
13	Miscellaneous	32	71	0.27	0.58
		329	564	2.76	4.64

The figures show in a striking manner the advantage which the safety car has as regards boarding and alighting accidents, the number of these two classes of accidents per 50,000 car-miles being 1.42 for the two-man car as compared with only .24 for the safety car. The two-man car operated an average of 35,300 miles for each boarding and alighting accident, while the safety car operated 213,000 miles; the two-man car carried 241,900 passengers (transfers excluded) for each boarding and alighting accident and the safety car 1,042,000 passengers.

STEP ACCIDENTS MATERIALLY REDUCED

Step accidents have always been the bane of the claim agent's existence. They are not only costly but they involve life and limb to a much greater extent than does any other common form of street railway accident and therefore they are of greatest moment to the car rider. The fact that they are all but eliminated with safety-car operation is a tremendously strong point in its favor.

Out of 329 important accidents with the safety car there were 207 personal injuries, while with the two-man car with 564 important accidents there were 446 cases of personal injury, the percentage of personal injuries being 63 for the safety car and 79 for the two-man car. This indicates, as would be expected, that the accident results are likely to be less serious with the lightweight car than with the heavy two-man car.

The accidents classified as "trivial" are not of sufficient importance to warrant showing the results in detail here. The figures show an average of 16.2 trivial accidents per 50,000 car-miles for the safety car and 24.9 for the two-man car.

Based on the comparative number of passengers carried, the showing as to number of important accidents is again very materially in favor of the safety car, as is shown in Table III.

Expressed in another way to show the average number of car-miles operated and passengers carried for each important accident the combined results for the thirteen companies are:

	Number Car-Miles per Accident	Number Passengers Carried per Accident
Safety car	18,124	88,670
Two-man car	10,779	73,782
Total	13,485	79,267

In some of the more recent wage arbitration proceedings it has been contended that the safety car introduces an additional hazard for the operating employee and this has been used as an argument for higher wages than might otherwise be justified. As an example of the extreme to which such a claim may be carried, considerable stress was laid on some testimony in a recent wage case of a large Eastern property to the effect that a safety car had skidded for some distance on a bad rail because the emergency sander had failed to operate. The fact was later developed that no damage had resulted and that the failure was due to the sandpipe having been clogged with stones. Under similar circumstances a heavy two-man car would probably have skidded considerably further and the chances of a serious accident would certainly have been greater. In other words, the argument in this case was, if anything, in favor of the light-weight car rather than against it.

The detailed figures from which the data as to the number of accidents were compiled show the following as to employees' injuries for safety and two-man cars:

	Car-Miles per Employee Injured	
	Important	Trivial
Safety car	542,075	156,917
Two-man car	129,349	51,961

As far as the hazard to the employee is concerned it appears that disregarding trivial accidents the odds are more than four to one in favor of the safety car.

As regards the comparative money cost of accidents for safety and two-man cars the records of the companies in question show that for the first five months of the current year they paid out 4.16 per cent of their combined passenger revenue for accident settlements. These payments do not, of course, correspond exactly with the accidents occurring during this period. Some of them applied on prior claims, while on some of the accidents which have occurred during this period claims are still pending. However, with as large a group of companies as is being considered here the effect of this difference should affect the results but little if at all, and the fact that the percentage of earnings paid out for accident settlements during this period corresponds almost exactly with the average for the entire year 1919 indicates that this assumption is a reasonable one.

The amounts paid out in settlements per 1,000 car-miles for the five months period are as follows:

Safety car	$10.60
Two-man car	15.00

The thirteen companies operated an average of 255 eighteen-hour safety cars and 245 eighteen-hour two-man cars during this period. On this basis the safety car shows an annual saving of $300 per car per year in accident cost, or substantially $75,000 for the 255 eighteen-hour cars in operation on a car for car basis, compared with two-man equipment, quite a respectable sum in these days of high operating costs.

Briefly, the above analysis, covering operations under such widely varying conditions as to make the information thoroughly representative and extending over a sufficient period of time to make it conclusive, shows:

(a) That the average number of accidents on a car-mile basis is about 70 per cent greater with the heavy two-man car than with the light-weight safety car.

(b) That the average number of accidents on the basis of passengers carried is 20 per cent greater with the two-man car.

(c) That the accident risk from the standpoint of the car operator is overwhelmingly in favor of the safety car.

(d) That the accident cost is about $300 greater per car per year with the two-man car.

(e) That in proportion to the number of accidents the number of personal injuries is 25 per cent greater for the two-man car.

As the use of the car is still further extended, sporadic attempts may be made in some cases to show that the term "safety car" is a misnomer. This need occasion no great concern provided the car is being properly operated, because it is then its own best and most convincing argument against claims of this nature. Furthermore, those responsible for such claims can make no great headway without the support of the car rider, and this, judging from past experience, will not be forthcoming.

Like any other mechanical equipment the safety car requires a reasonable degree of care and intelligence on the part of the organization which is responsible for its operation. In the hands of a prejudiced operator, favorable results are not to be expected. Careless and reckless operation will involve accidents with any type of equipment, and in this respect the safety car is no exception to the general rule. Run at high speeds in heavy traffic, any car will, sooner or later, kill some one. Operated at dangerous speeds over bad track, any car will sooner or later be ditched, with the usual attendant results. The safety car is not infallible. No one who understands the situation, and least of all the operating men. who have been largely responsible for its success, and to whom the lion's share of the credit belongs, will claim that it is immune from accidents. They will contend, and with good reason, as the figures given above amply prove, that given a square deal and operated according to the dictates of ordinarily good street railway practice its accident record is decidedly better than that of any other type of car developed.

Great Britain's Tramways Hard Hit

THE present condition of the city electric railways is editorially summarized thus in a recent issue of the *Electrician*, London:

> The lot of the present-day tramway manager is not a happy one. Faced with frequent demands for increased wages and with steadily advancing prices of materials for repairs and track reconstruction, he has been compelled to resort to increases of fares in order to balance his accounts. In some cases these increases have amounted to as much as 100 per cent of the pre-war figures. Just as in taxation, there is a limit in tramway charges beyond which it is useless to go, and there are indications that this limit has been passed in some undertakings, though, unfortunately, there is no guarantee that finality has been reached in demands for advances in wages or in the upward movement of other items in the working costs. In many provincial towns the minimum fare is now 1½d., and in some cases it is 2d. The effect has been a great reduction in the number of passengers carried, and though there has been an increased gross revenue in some cases this has not been as high as was anticipated. People prefer to walk or to patronize rival motor omnibus or char-a-banc services rather than pay the higher fares. For instance, at Portsmouth there was a reduction of 1,500,000 passengers in eight weeks after the abolition of penny fares. At Glasgow, which possesses the cheapest and probably the best tramway service in the United Kingdom, the disappearance of the halfpenny stages has caused a weekly drop of more than 1,100,000 passengers, but the net result is a substantial increase of revenue.

Wilcox Issues Statement

Criticises Federal Commission Report for Rejecting Public Ownership and Not Publishing His Analysis—Effect of Fare Increases

SEVERELY criticising some aspects of the Federal Commission report, Dr. Delos F. Wilcox has made a statement which he has widely distributed to the daily press. This statement to the press, some eleven pages in length, is almost wholly devoted to arguments supporting public ownership as the logical conclusion of the commission's investigation. Dr. Wilcox believes municipal ownership less experimental than service-at-cost, recommended by the commission. He regrets that the meagerness of the federal appropriation of $10,000 makes it impossible for the commission to publish the entire record and closes with the discussion of the traffic analysis showing the effect of fare increases which he made. From this analysis Dr. Wilcox would conclude that the fare increases had caused the railways to be less useful to the public. The summary of this analysis is given in the accompanying table.

Dr. Wilcox accompanies his statement with his nine-page letter of June 8 to Chairman Charles E. Elmquist of the commission, in which he summarizes his conclusions.

GENERAL SUMMARY OF ANALYSIS OF EFFECT OF FARE INCREASES UPON TRAFFIC AND REVENUES OF PRINCIPAL STREET RAILWAY SYSTEMS OF THE UNITED STATES—COMPILED FROM DATA COLLECTED BY THE FEDERAL ELECTRIC RAILWAYS COMMISSION. THE CITIES OR SYSTEMS FOR WHICH STATISTICS HAVE BEEN COMPILED HAVE BEEN DIVIDED INTO CLASSES, ACCORDING TO THE PERCENTAGE OF INCREASE IN THE AVERAGE FARE PAID DURING THE FIRST NINE MONTHS OF 1919 OVER THE FIRST NINE MONTHS OF 1917

(Table VI of Analysis of Effect of Fare Increases on Traffic and Revenue)

Class	Number of Cities or Systems in Class (1)	Number of Revenue Passengers Carried First Nine Months of 1917	Per Cent of Total Electric Railway Traffic of Country	Average Fare per Revenue Passenger First Nine Months of 1917, Cents	Number of Revenue Passengers Carried First Nine Months of 1919	Average Fare per Revenue Passenger First Nine Months of 1919, Cents	Per Cent Increase in Average Fare Paid First Nine Months of 1919 Over First Nine Months of 1917	Per Cent Increase in Number of Revenue Passengers Carried First Nine Months of 1919 Over First Nine Months of 1917 (D—Indicates Dec.)	Per Cent Increase in Passenger Revenue First Nine Months of 1919 Over First Nine Months of 1917
A (2)	13	2,465,440,094	29.16	4.93	2,837,238,677	4.95	0.41	15.08	15.65
B (3)	11	908,511,165	10.74	4.98	1,005,987,031	5.31	6.63	10.73	18.11
C (4)	29	1,583,795,790	18.73	5.28	1,689,085,597	6.22	17.80	6.65	25.63
D (5)	15	1,521,714,987	18.00	4.62	1,406,987,088	6.55	41.77	7.54 (D)	30.97
ALL.	[illegible]	6,479,462,026	76.63	4.95	6,939,298,393	5.64	13.97	7.10	21.96

(1) All systems operating in a transportation area where fares have not been substantially changed, or where fares have been changed uniformly, have been counted as a single system, as in New York City; where different systems in the same transportation area or different local divisions of the same system have had their fares raised in different proportions, so as to fall within different classes in Table IV and Table V, they have been counted as separate systems.

(2) Cities or systems upon which there was no increase of fare from the first nine months of 1917 to the first nine months of 1919, or upon which the increase in the average fare paid was less than 3 per cent.

(3) Cities or systems upon which the increase in the average rate of fare paid during the first nine months of 1919, as compared with the first nine months of 1917, was between 3 per cent and 10 per cent.

(4) Cities or systems upon which the increase in the average rate of fare paid during the first nine months of 1919, as compared with the first nine months of 1917, was between 10 per cent and 25 per cent.

(5) Cities or systems upon which the increase in the average rate of fare paid during the first nine months of 1919, as compared with the first nine months of 1917, was more than 25 per cent.

From the analysis of this letter it appears that with reference to the facts of the situation and circumstances surrounding the industry in its present status, Dr. Wilcox is in thorough accord with the findings of the commission. It is only with reference to conclusions and recommendations for the future that Dr. Wilcox differs from the commission in that he would have the only solution municipal ownership.

Starting from the same point of agreed fact as the commission, Dr. Wilcox argues toward municipal ownership as follows, in brief abstract:

1. Local transportation is affected with a public interest.

2. Heretofore under private ownership capital has assumed the management. Speculation has been an incentive. Divorced from management, capital would ask only a fair return.

3. The cost of labor has been determined by supply and demand. If labor ever entered into management in any degree it would demand something in addition to a fair return.

4. The public has so fundamental an interest in electric railway service that it cannot permit itself to be the victim of the vicissitudes of an unregulated struggle between capital and labor. Therefore, it is necessary that a direct relation between the public and labor be established.

5. With the establishment of these relations the responsibility of capital for management is undermined and its motive for efficiency in management weakened if not destroyed. With the assumption of direct responsibility for labor conditions and for continuity of service, the next step, logical and necessary, is assumption by the public of complete responsibility for management and the limitation of capital to its true function of supplying funds.

6. The problem of credit can most effectively be solved by public ownership undertaken through the acquisition of the existing electric railway properties at a fair price. Upon this basis capital will retire from the management and will assume the same subordinate but useful position that it already occupies in relation to municipal improvements generally.

7. The assumption of management by the public will involve the definite public recognition and guaranty of the rights of labor to a living wage, reasonable hours and just conditions of work, and will, at the same time, place electric railway employees in the position of civil servants with the advantages and responsibilities which are implied in that relationship. Labor is different from capital. One of the principal jobs of public management will be to work out a better relation to labor.

8. The imperative need of the present time is the acceptance of public ownership and operation as a policy. Any temporary relief granted to the electric railways and any temporary readjustment of their public relations under private ownership and management ought to be consistent with and preparatory for the early and effective consummation of public ownership and operation as the ultimate policy.

Opinions from the Industry

Federal Electric Railways Commission Report Elicits Favorable Comments as to Its Value as an Aid in the Solution of Railway Problems — Some Critical Remarks on Certain Features

IN THE short time available since the Federal Electric Railways Commission report was received by most railway men it has been possible to obtain only a few comments, but those received are published herewith. The invitation remains open to add to the discussion on this subject, both as to how the report may affect the railway problem and as to how the railways may make use of the report, and it is planned to publish additional comment in the next issue or two.

Thomas S. Wheelwright

President Virginia Railway & Power Company,
Richmond, Va.

I am satisfied that the very excellent report made by the commission has a decided educative value not only with the public but with the local authorities to whom appeal must be made for improvement of the present status.

William G. Bliss

Chairman of the Public Utilities Commission
of Rhode Island

The report is a very comprehensive summary of the electric railway situation. The conclusions, while presenting nothing of a novel character to those who have been compelled to follow the changing character of the problem, should carry great weight because of the high character of the Federal Electric Railways Commission and because of the complete nature of its investigation.

Arthur W. Brady

President Union Traction Company of Indiana,
Anderson, Ind.

The report of the Federal Electric Railways Commission represents the result of the most comprehensive and impartial investigation ever undertaken of the electric railway field. While every conclusion reached may not command unanimous support, the report as a whole is a document of the greatest value. It should do much to clarify the atmosphere and to aid in establishing better relations between the industry and the public and thereby to render it possible for the industry to increase its field of usefulness.

Paul Shoup

President Pacific Electric Railway,
Vice-President and Assistant to the President
Southern Pacific Company,
San Francisco, Cal.

The Federal Railways Commission, in its report, states the case thoroughly in saying that such conditions must be created controlling the electric railway industry as will restore the confidence of investors therein. I concur in nearly all of the conclusions expressed in the report:

1. That the fares shall be responsive to the investment and operating expenses of the property concerned.

2. That motor vehicles operated as public utilities in competition shall be subjected to as great taxation as are the electric railways and made to bear a share of maintaining the public highways equivalent to that which the electric railways would bear if they occupied them.

3. That where good electric railway service is given motor vehicle competition shall not be permitted, which is to the public interest in preventing the distruction of highways and keeping them from, in time, becoming private roadways for commercial uses.

4. A definite agreement with public regulating bodies as to the value of every electric railway property, whether determined by physical valuation or by conference, and a thorough understanding that thereafter rates will be such as to bring a fair return thereon, this being absolutely essential to the re-establishment of credit.

5. That electric railways shall not be called upon to bear extraordinary burdens in connection with public relations in the way of non-profitable investments such as grade separations, highly expensive paving, replacing wooden poles with metal and building unwarranted extensions under public direction.

To conclude, the relations between the public and the electric railways are local and must be so treated and established on such a permanent basis as will give a return on the investment in such properties.

John J. Stanley

President the Cleveland Railway Company,
Cleveland, Ohio

The report of the Federal Electric Railways Commission will help the industry if the country is sufficiently interested to heed it. It is too late to save those companies that are bankrupt or in the receiver's hands through public apathy. It will not help the industry now unless the public can be roused from its apathy on matters where public utilities are affected. Any community more interested in the rate of fare collected on its street railway than the development of the railway and the service given by it will be slow to follow the recommendations of the commission. Service-at-cost is not a panacea for all street railway ills. It can be effective only when a community knows what it wants in street railway transportation and is willing to pay for it. How the public generally is to be brought to a full realization of its transportation needs and costs I do not know, unless the complete breaking down of service throughout the country carries home the lesson.

C. L. S. Tingley

Second Vice-President American Railways,
Philadelphia, Pa.

I am in hearty agreement with the conclusions and recommendations, with the exception of those contained in Section 1, paragraph XVI, which, it would seem to me, would force the companies back into the realm of municipal politics, from which state regulation is intended to divorce them.

With respect to the uses to which the report can be put, it would seem to me that it should be given the widest publicity and should be referred to and made the basis of all public discussions of the question. It would have been desirable if they had placed more stress upon the necessity for the means of restoring credit.

It is quite apparent that the so-called universal 5-cent fare has in the past in many instances never provided a sufficient income to meet operating expenses, depreciation, taxes and security to the investor of the integrity of his investment and a fair rate of return thereon, for unless there be a reasonable margin over and above the fair rate of return, which not only need not but as a matter of fact should not be declared in dividends, there will not be that margin of safety which is necessary to insure the investor of the integrity of his property and attract new capital thereto. The lack of this margin in the past has compelled the electric railway to secure an undue proportion of the funds necessary for capital expenditure through the medium of bond issues, thus giving a distorted capital structure and inviting disaster in times of stress.

E. G. Connette

President United Gas & Electric Engineering Corporation,
New York, N. Y.

The report of the Federal Electric Railways Commission is more or less academic. It has no practical value except for reference.

The recommendations of the commission are not new. A service-at-cost plan might be acceptable with a fair valuation of the property and a rate of return allowed on invested capital, and for new capital, that would be attractive to investors.

The credit of street railroads is gone and can only be restored by recognition of public authorities that capital as well as labor is entitled to a proper wage. Capital cannot be coerced. It must be induced. Street railroads to give proper service must be able to provide for maintenance, renewals and replacements and for extensions of service. This requires capital.

Efficiency and initiative in operation and service should be recognized by making the rate of return flexible, as well as to take care of fluctuating interest rates.

Renewals and replacements must be made at the present day costs, and provision for a larger reserve on this account is necessary and to take care of accumulated wear and tear that must ultimately be replaced at the present high prices.

James P. Barnes

President Louisville Railway,
Louisville, Ky.

It is the best analysis of the country's street railway situation ever made, I believe. A glance at the personnel of the commission will show that it is peculiarly representative of the country in the wide variety of selections made for its membership. I think, therefore, that it is noteworthy that this commission agreed so exactly on the very thing which has been our program here in Louisville and is set forth briefly in paragraph 14 of the report:

"Unless the usefulness of the electric railways is to be sacrificed, public control must be flexible enough to enable them to secure sufficient revenues to pay the entire cost of the service rendered, including the necessary cost of both capital and labor."

W. Kesley Schoepf

President the Cincinnati Traction Company,
Cincinnati, Ohio

The report of the Federal Electric Railways Commission will be most beneficial to the public, the companies and employees, by having street railway problems and their solution presented so clearly by an impartial authority representing all interested parties. Recommendation of a service-at-cost plan is of particular interest to this company and Cincinnati because of the fact that this plan is in successful operation here. Consideration given to restoration of credit, relief from special assessment, non-paying extensions, jitney and private automobile business and an understanding and co-operation between the company, the public and the employees is especially valuable.

C. D. Emmons

President United Railways & Electric Company,
Baltimore, Md.

The committee has succeeded in stating in a very concise form its summation of a mass of testimony which, under the very nature of the testimony and the divergent sources from which it was ascertained, must have been more or less confusing and contradictory to it. On the whole, I feel the report should be very helpful to street railway interests throughout the country and it is to be hoped that wide publicity will be given to it.

Of particular interest to the writer is the treatment of the question of taxation, as in a great many cities, especially in Baltimore, the street railway company is to a large extent the collector of taxes for the city itself. Through our park tax, which is 9 per cent of our gross city revenues, we will collect for the Park Board of the city of Baltimore during the year 1920 more than $1,250,000; this in addition to all other forms of taxes known to the industry, including assessments for sprinkling and street paving.

The suggestions as to the regulations of competitive automobile, motor bus and jitney service and their being required to pay a tax comparable to the taxes paid by the street railway company are extremely timely and pertinent. Almost every one of the twenty-two conclusions and recommendations is interesting and will, no doubt, bring before the public at large some of the many interesting intricate problems that confront the industry.

J. H. Hanna

Vice-president the Capitol Traction Company,
Washington, D. C.

The report of the Federal Electric Railways Commission puts before the public fairly and definitely, and with official authority, the very facts concerning the industry which the companies, individually and through the American Electric Railway Association, have been endeavoring for many years to make known.

The fact that this report makes definite statements on conditions and recommendations for their improvement and is made unanimously by men chosen from every interest represented should assure it the serious consideration of regulatory bodies and do very much to bring about the co-operation of the public in electric railway matters, which, as the report itself states, is the most essential thing to be accomplished in remedying the situation.

A Model Traffic Law

SESSIONS of the annual meeting of the National Traffic Officers' Association, held at San Francisco, Aug. 23-27, were devoted largely to separate meetings of ten committees, each of which was instructed to prepare recommendations on how matters in its field should be covered in a model traffic law. An electric railway representative served on each committee. W. H. Maltbie, general counsel of the United Railways & Electric Company of Baltimore, Md., presented a proposed traffic ordinance which had been drafted by the committee on code of traffic principles of the American Electric Railway Traffic & Transportation Association. A full report of the meeting and a digest of the A. E. R. T. & T. A. ordinance will be presented in an early issue.

Coal Reports to Cease

THE Federal Trade Commission in a late bulletin on the bituminous coal situation threatens to suspend publication in the future as only about one-fourth of the operators are reporting operating figures to the commission. The reports would be useless or at least untrustworthy and misleading, if based on too small a number of operators reporting and there is no way to force reports to be made.

The figures from the 680 operators voluntarily reporting show an f.o.b. average mine cost per 2,000 lb. of $2.77 and an average sale price of $3.31 per ton. Of the cost $2.07 represents labor cost, 31 cents supplies and 39 cents overhead. The margin of 54 cents is not all profit, as other deductions or additions must be made. The margin for the first three months of 1920 was 38 cents, as compared to 54 cents for May.

If the operators in the West Virginia field report correctly coal should have been available f.o.b. cars at Hampton Roads at about $5.40 per net ton. The operators reporting mined about 20 per cent of the bituminous coal produced in May.

Track Evolution in Edmonton

A Description of Several Years' Experience with Various Types of Track Construction in Edmonton, Alta., Canada, Reviewing Factors Determining the Design of Paving Base, Track Drainage and Paving

EDMONTON, ALTA., is a young, vigorous Canadian frontier city in which electric traction history is short but instructive. As in many Canadian cities, the electric railway system is municipally owned and operated. The story of track development in this city is told in an article printed in the *Canadian Engineer*, April 22, 1920, and written by C. C. Sutherland, assistant roadways engineer of the city engineer's department of Edmonton. Mr. Sutherland's article is entitled "Street Railway Permanent Track Construction."

The article gives a review of matters of interest in connection with track drainage, paving base, paving, track construction and maintenance, covering several years' experience in the city of Edmonton with these important items. The following abstract of Mr. Sutherland's article should be of interest. After a résumé of the history of track design in general, the writer says that while there are many methods of transmitting the loading of the rail to the subgrade below, they may be divided, generally speaking, into (1) girder type, (2) slab construction, (3) ballast base construction and (4) monolithic concrete construction.

The girder type of trackwork carries its load on a continuous concrete girder underneath the rail, with a cross girder under each tie. The pavement base is poured at the same time as the girders, but where the rails are 7 in. or less it cannot be expected that this thin slab will carry a part of the loading. Steel ties are invariably used with the girder construction and are placed from 6 to 10 ft. apart. They serve only as tie rods in holding the rails to gage, taking very little part in supporting the load.

The slab construction carries its load on a 6-in. or 8-in. concrete base, extending the entire width of the track, which may be brought to grade by using a light sand cushion or by shimming up the ties with wooden wedges and pouring a weak concrete filler or placing a 4-in. or 5-in. layer of rock ballast around and under the ties.

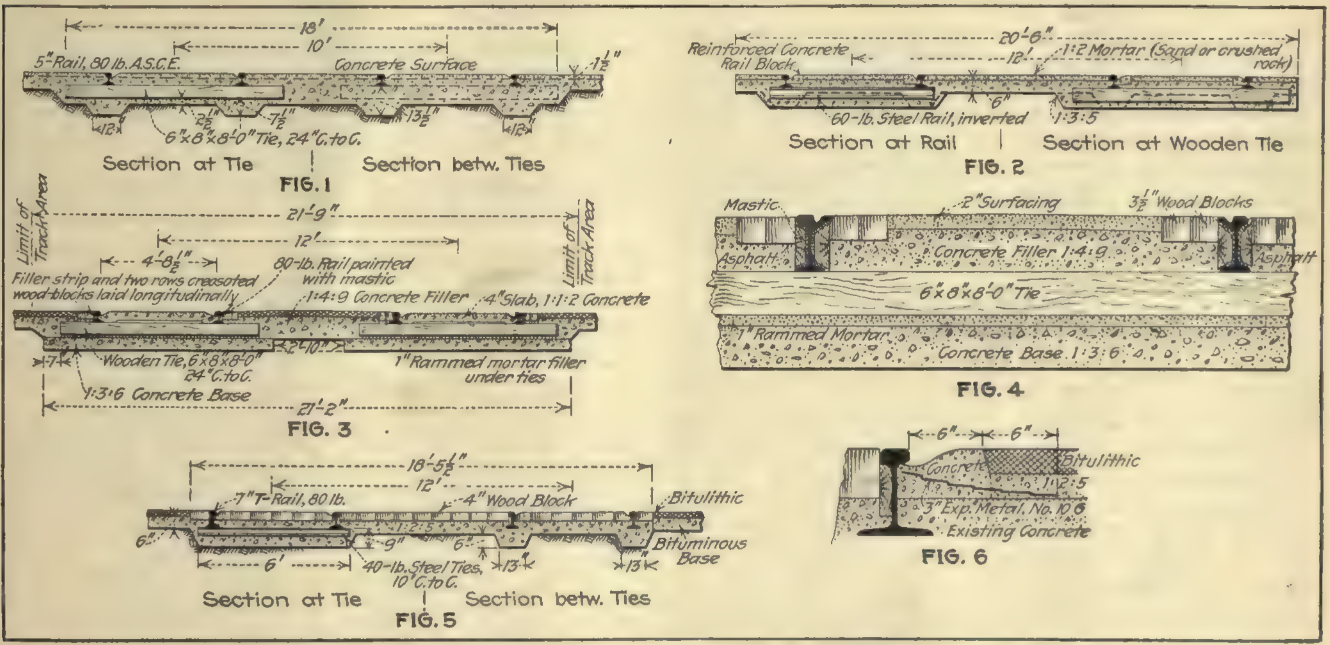
In the case of ballast base construction the load is carried on a 6-in. to 10-in. gravel or crushed rock base which extends well out at each end of the ties. Some railway companies lay a ballast base, but bring the concrete which supports the pavement down under the base of the rail, thus making a combination girder and ballast construction.

The monolithic concrete construction, as the name implies, is poured in one operation. It carries its load, however, in much the same way as the slab construction, the concrete under the slabs varying from 6 in. to 8 in. in depth.

VARIOUS TYPES OF PAVEMENT LAID

In Alberta, where local clay does not make a paving brick and where there is no granite to be obtained, the choice of a pavement is restricted to materials that may be shipped at a reasonable cost, or to local materials. The selection is limited to wood block, bituminous pavement, concrete or some combination of two or more of these materials. A description of each class of pavement will be included in the following résumé of the different types of trackwork laid in Edmonton.

The first permanent street railway track in Edmonton was laid on Jasper Avenue, between 101st Street and



VARIOUS DESIGNS OF TRACK CONSTRUCTION IN EDMONTON, ALTA., CANADA

Fig. 1. Design for 1910 construction.
Fig. 2. Design for 1912 construction.
Fig. 3. Design for 1916 construction.
Fig. 4. Another design prepared in 1916 for future construction.
Fig. 5. Design for 1907 construction.
Fig. 6. Replaced 1907 design in 1910.

109th Street, in 1907. Fig. 5 is a cross-section through this construction. The section is a girder type, having a 13-in. bearing at the bottom of the girder, with a depth of 9 in. under the base of the rail. The rails are held together every 10 ft. with 40-lb. inverted steel ties, fastened to the rail flange with bolts and clips. Each cross-tie is supported by a cross-girder 6 in. deep. Sixty-foot 7-in. 80-lb. Lorain-section rails were used, and heavy Atlas joints, which were bolted to the web with sides well up under the head and with the lower part of the joint carried under the flange where it acts as a girder in supporting the rail ends.

Concrete was poured to within 4 in. of the top of the rail and allowed to set. A wood-block pavement was laid down between the gage lines and in the devil strip, the blocks next to the rails on the outside being kept vertical by the use of a treated wooden filler strip laid against the web, while the blocks laid on the gage side of the rail were notched to allow for the wheel flange clearance.

After two years of comparatively light traffic it became apparent that the wood blocks between the gage lines would not stay down. The flanges of the wheels first split the blocks, and as dirt and water were forced into the cut the blocks arched up until they caught on the fenders of the car.

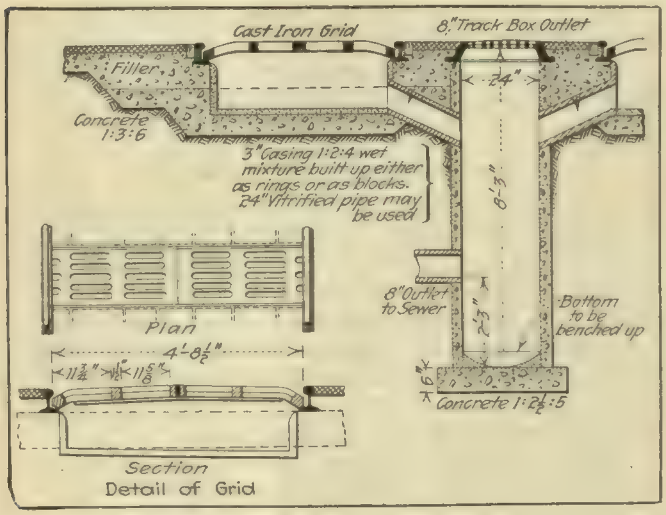


FIG. 7. DESIGN OF TRACK BOX PREVIOUS TO 1915

During 1910 all wood blocks were removed from between the gage lines and replaced by a reinforced concrete rail stretcher, with a 2-in. bituminous surface between the stretchers. Fig. 6 shows a detail of this reconstruction.

The surface of the existing concrete was fully cleaned off with steel brooms and a rich concrete rail block, 6 in. wide and 4 in. deep, was laid at the gage side of each rail. Before the initial set had taken place the intervening space was poured with concrete mixed in the proportion of one part cement, two parts sand and five parts washed gravel or crushed rock. Strips of expanded metal were placed in the rail block, with one end embedded in the pavement base. After sufficient time had elapsed for the concrete to set the 2-in. bituminous surface was laid.

When the track on Jasper Avenue had been subjected to heavy traffic for four years it had become evident that the girder would not hold. The joints settled first, followed by other portions, and in 1915 it was found necessary to replace several hundred feet of the worst parts by a later design. In 1916 most of the pavement was removed and the joints blocked up.

From the fact that this kind of construction carried a fairly heavy traffic for four or five years on a partially saturated subgrade it would seem reasonable to expect that for moderate traffic on a well-drained subsoil, such as gravel or coarse sand, this type would give satisfaction. In connection with the two rows of wood blocks, which insulated the bituminous pavement from the rail, it was a noticeable feature that the block next to the soil followed the rail down 2 in. or 3 in. as the girder sank, while the other block remained intact with the surface, the two blocks sliding on each other.

The next type to be constructed was on Namayo Avenue. The loading was carried on two concrete girders and the rails were held together by tamarac ties spaced at 2-ft. centers (see Fig. 1). The rails used were 5-in. 80-lb. A. S. C. E. sections, held together by continuous joints. After the trenches had been excavated the skeleton track was blocked up and the base poured. In this case the track pavement was a two-course concrete slab, and it was possible to pour the track base and paving base in one operation. The top surface was added before the base had taken its initial set.

The track was constructed in 1910, but did not carry traffic until two years later. After eight years of service the track is in good alignment and grade, but has a tendency toward raveling on the inside and outside of the rail, and in one or two places the slab between the gage lines has raised. It is thought that a great deal of the success of this type of construction lies in the fact that as operation did not commence until two years after construction the concrete had every opportunity to develop considerable strength.

NEW DESIGN OF CONSTRUCTION PREPARED IN 1912

In 1912 an extensive program of street railway track construction was planned and a new design was prepared, as shown in Fig. 2. The construction is somewhat similar to the Jasper Avenue type, but, in order to decrease the unit pressure on the subsoil, cross-ties and cross-girders were placed at 5-ft. instead of 10-ft. centers. It was planned to use 60-lb. steel rails alternately with wooden ties, but as the steel rails were not obtainable wooden ties were used throughout the construction. The specifications called for two bids, one for the completed 10 and 12-ft. center tracks with a pavement wearing surface of 1:2 mortar, and a second bid for the completed tracks ready to receive a 2-in. bituminous surfacing between the gage lines, in the devil strip and on the outside of the rails. In this latter construction reinforced concrete rail blocks were to be constructed to form the flange clearance and act as a shoulder for the bituminous surface. On certain streets work was started late in the fall, with the result that the concrete rail blocks were caught by the frost and had to be removed. They were replaced by a concrete slab 4 in. thick. Before this work had been down five years the surface was badly cracked and broken up at a number of places, especially at the joints. A slight settlement in the girders was followed by a breaking up of the concrete pavement.

In 1913 a radical change was made in the track design. It was thought that the track construction did not give sufficient bearing surface and, working toward that end, the old style of girder construction was abandoned and a 6-in. slab built completely across the track area. In case of a cut a burm 2 ft. 10 in. wide was usually left between the base slab in the 12-ft. center construction, but in fills the difficulty of forming this burm offset the saving of concrete. After this base had set the tracks were assembled and bonded. Fig. 3 shows the general cross-section of the 1913 construction, with the difference that a 1-in. sand cushion was placed under each tie instead of the mortar, as shown; the wood blocks were not laid on the outside of the rails, and the slab between the gage lines was reinforced.

Some of this construction showed signs of failure after four years' usage, and the most noticeable failure occurred on Alberta Avenue, where there had been constructed a double line of car tracks, built at different times. On the south track the joints were made of ordinary four-hole splice bars and with little or no attention paid to the spacing of the ties at the joints. On the north track the joints were made with four-hole continuous joints. Both tracks were subjected to the same traffic, yet the south track gave way at the joints, while the north track remained in good condition.

On other streets the results were more satisfactory excepting that in some places the bituminous surfacing at the outside of the rail broke away, and in a number of places the concrete slab between the gage lines raised, due to dirt and water finding their way under the slab, through a crack just inside the gage lines, where the slab sheared.

The cause of failure of the slab was thought to have been partly due to the giving of the sand cushion under the tie. It would seem better practice to construct a good sound support for the ties and depend on wooden ties for resilience.

CONSTRUCTION ACCEPTED AS STANDARD IN 1915

With the experience now obtained, the track design as shown in Fig. 3 was accepted as the standard construction for 1915 and 1916, when 2.8 miles were constructed. The 6-in. concrete base of the 1913 construction was retained, but the sand cushion was replaced by 1-in. of rammed mortar under the ties, which were shimmed up with wooden shims placed near the end of the ties.

Before the filler had time to set the concrete slab between the gage lines was poured, precaution being taken to paint the rail with an asphaltic compound to prevent the bonding of the concrete to the rail. On the outside of the rail were placed two rows of treated wood blocks with a treated wood filler strip to fill the web. In forming a base for the two blocks the rough filler was leveled with a mortar and painted with an asphaltic paint.

In this type of construction the ties are supported on a rigid bearing, but the wood blocks and mastic joints leave the rail free to move up and down to give a certain resilience to the track, but without affecting the adjoining pavement.

To review the condition of the various types of trackwork under operation: The girder type has not held up under Edmonton conditions, especially at the joints and at streets intersections. In the later design, where the bituminous surfaces were laid against the rail, it usually raveled, but this has been overcome by the wooden tail blocks. The biggest trouble has been caused by the flange of the wheel cracking the concrete slab just inside the gage line. These cracks soon became large and water found its way down under the slab, with the result that hundreds of feet of this slab had to be removed.

The results from operation on the various types of track construction described have certainly demonstrated the fact that it is almost impossible to construct a permanent pavement around the T-section of rail.

DETAILS OF EXCAVATION, CONCRETING AND DRAINAGE

In preparing the subgrade for a street railway track, ready to receive the concrete base, it may be possible under some conditions to take out most of the rough grade with drag scrapers, but under most conditions this dirt must be hauled off the streets to some suitable dumping place in dump wagons. After the rough grade is taken out the subgrade is trimmed, leaving the loose dirt from ¾ in. to 1¼ in. above the final grade, to allow for setting under the roller. All soft spots should be made firm with new material. This work may be paid for on a cubic yard basis, which will include "rough grade" and "fine grade" rolling and carting of all surplus materials.

In preparing to lay concrete, consideration should be given to the selection of material, methods of mixing, methods of placing and the care or "curing" of the green concrete.

The coarse aggregate may be obtained from well-graded gravel or a hard, tough material suitable for crushing and graded to pass a 2-in. ring. The fine aggregate may be any well-graded clean sand or crusher screening from a durable material. Experience at Edmonton has shown that "pit run" gravel—that is, a mixture of coarse and fine aggregate coming direct from the pit—has too great a variation between the percentage of fine and coarse aggregate to make good concrete, and the specifications require that "only segregated materials shall be used." The cement used should conform to the standard of the Engineering Institute of Canada, but may be released on passing the seven-day test.

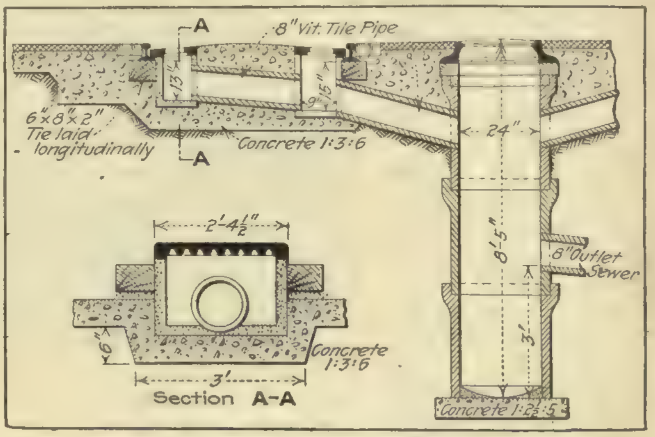


FIG. 8. DESIGN OF TRACK BOX IN 1915

The concrete should be mixed in some form of "batch" mixer where the materials are measured separately for each batch. It is not necessary actually to measure all the materials in a measure, but good results may be obtained by using small wheelbarrows. It is usually a good plan, however, to have a bottomless measure on hand to place over the wheelbarrow as an occasional guide to the laborer. Under no consideration should material be shoveled directly into the hopper. The mixing should continue long enough and with sufficient water to insure that all the particles have been coated with a cement film. Excess water should be avoided so that the concrete will leave the mixer in as stiff a condition as it can be conveniently handled.

In placing concrete on the subgrade some engineers recommend the use of "open chutes" or the "boom and bucket" method, but experience on street railway work in Edmonton has shown that good concrete can be laid with dump carts, provided the concrete is raked or shoveled into place after it has been dumped. In placing the filler concrete between the tracks in the 1916 standard construction a special gangway was built which enabled the carts to be backed out over the first track to fill in both tracks in one operation.

In hot weather the surface of the green concrete should be kept moist by sprinkling with a hose, and after a day or so covering with earth. The covering should be kept moist for at least two weeks. To get good concrete it must be protected from the drying out effect of the sun and wind, and more especially will this be true in countries of high altitude where the rate of evaporation is high.

Track drains, which are provided to catch the rain and melting snow that runs along the track allowance and carry it into the sewer system, should be placed at least every 800 ft. on a long grade and at the intersection of descending grades.

Fig. 7 shows the older type of track box built in Edmonton previous to 1915, in which the grill casting was made in two pieces, with the grills at right angles to the traffic. The water drops into a concrete box with an outlet pipe to the silt well, which is connected to the sewer.

The silt wells may be built of concrete blocks, brick or vitrified cull tile pipe. It has been found that excellent results may be obtained by using three pieces of 22-in. or 24-in. vitrified pipe standing on end in a concrete base. The casting of the top is usually a standard manhole frame and cover made to fit on the tile by corbeling up with brick.

This type of track box has given satisfaction with the exception of the grill, of which a large number of the old type were found with one or more bars broken off by the traffic. In making a new design it was decided to lay the grill lengthwise along the rail, thus greatly increasing the inlet capacity. Fig. 8 shows a section of the new type in use since 1915.

PRACTICE FOR PAVEMENT MAINTENANCE

The question of who should maintain the pavement on the street railway allowance has received a great deal of attention, and usually it is required that the street railway company should keep the pavement on the railway allowance in good repair. In the city of Strathcona, prior to its amalgamation with the city of Edmonton, the street railway department paved and maintained a strip 8 ft. wide over a single track, the remainder of the cost being assessed on the abutting property. In Edmonton abutting property is assessed for the pavement on the street railway allowance. The railway department usually constructs the completed permanent track and is reimbursed for the pavement at the same rate per square yard as the contract price of the adjoining pavement. The most common practice is to require the street railway company to construct and maintain a pavement equal to that on the adjoining roadway, the limits of the street railway allowance being defined by the area covered by the overhang of the cars or by some given distance such as 18 in. or 24 in., outside the outer rail.

During 1913, when a large program of permanent track construction was carried out, several miles of track were constructed on streets where the adjacent roadways were not paved. Traffic kept to the paved strip, with the result that from the mud and concentrated traffic the bituminous surface in the devil strip soon developed holes and ruts. In this case the city commissioners decided that the street railway department should pay one-third of the cost of maintenance and the street department the other two-thirds.

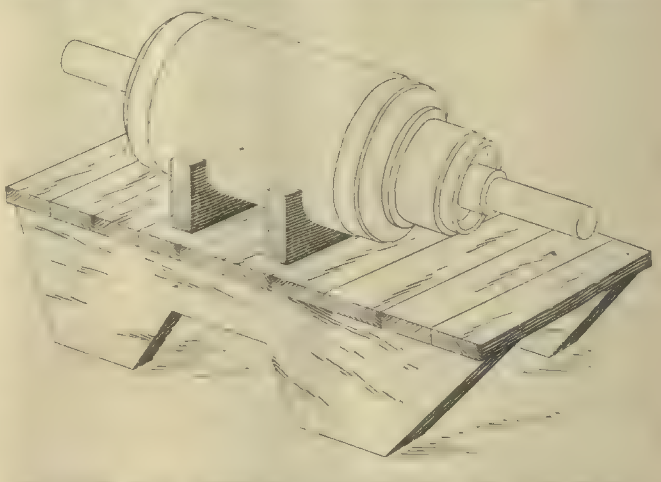
Pavement replacements or repairs may usually be carried out without interruption to traffic, but where the track base gives way considerable difficulty may be experienced in making repairs. The method that has been adopted in Edmonton is as follows:

Where a track has settled the pavement is first removed and piled in a convenient place and the rails and ties are cut free from the concrete base and jacked up on runners made of 6-in. x 6-in. timber of various lengths. The subgrade, having been cleared of the old base, is then refilled and tamped with a suitable material and the new concrete base is poured. When this has set sufficiently the track is shimmed up into the base and runners removed and concrete filled up to the pavement line.

Edmonton has taken up a large area of bituminous pavement in recent years, and it has been found that by heating this on a plate of sheet iron and mixing while hot the retempered material gives satisfaction as a new surface.

Supporting Cradles Reduce Damage to Armatures

THE officials of the Pittsburgh Railways believe it worth while to keep armatures in their repair shop off the floor, as any rolling is liable to damage the coils and there is danger of small particles of metal being picked up, which would result in a short circuit. They have made cradles of rough 2-in. lumber of the type shown in the accompanying illustration. Armatures are placed on these whenever they are not actually in machines or being worked on and before they are ready to be put in storage racks. The type of construction used permits of lifting the armature, together with its cradle, by a crane or hoist by passing the chain or rope used as a sling underneath the cradle and around the ends of the armature shaft. The resulting reduction of damaged armatures is said to have been considerable since this method has been put into practice.


CRADLES FOR KEEPING ARMATURES OFF THE FLOOR

"Omnibus Automobiles" in Rio de Janeiro

Storage Battery Bus Used by the Local Tramway, Light & Power Company on Chief Business and Pleasure Avenue of City

BY V. L. HAVENS
Editor *Ingenieria Internacional*

TO THOSE whose experience has been limited to the cities where omnibus service has been introduced only because of the congestion of the tramways it is a surprise to see the excellent public automobiles along the main avenue of Rio de Janeiro, but there is, as always, a reason for handling the traffic in a certain manner.

The tramway system of the capital of Brazil is excellent and the cost of passage, based on the zone system, is very reasonable. There is some satisfactory method of reaching every corner of the city by means of the coaches of the company, locally referred to as *bondes*, with the exception of the Avenida Rio Branco, the main artery of pleasure and commerce.

This avenue may well be compared with Fifth Avenue of New York, San Francisco of Mexico City, Prado or San Martín in Habana or Buenos Aires, but is much wider than any of the streets mentioned, and in addition to the pleasure seekers who throng the thoroughfare at certain hours of the day one also finds here the principal banks, newspapers, hotels, cafés and theaters, as well as some of the offices of the government.

TRAMWAY COMPANY BUS ON AVENIDA RIO BRANCO, BEFORE FAMOUS MONROE PALACE, RIO DE JANEIRO

The need of an adequate transportation system is obvious to any one, but the laying of street railway lines in this street has never been permitted because of the inflexibility of traffic along such lines, and also because of the opinion held by some people that the æsthetic qualities of the avenue might be damaged by such a procedure. The real and serious criticism directed toward the laying of tracks has of course been the *motif* for the introduction of the omnibus, and the possibility of a trackless trolley has received less consideration than it merits because of the natural tendency in one's mind to think of the track and the trolley simultaneously, although many European cities have found it possible so to construct the trackless trolley system as to make the overhead center pole type an adornment rather than a defect. There are many people in the city who feel that the time must come when a more rapid means of transit along the avenue will be necessary, but since the authorities prefer the omnibus system, for the present, the Rio de Janeiro Tramway, Light & Power Company, Ltd., has adapted its methods to that plan and offers a service, from 7 in the morning until 7 in the evening, which compares very favorably with that of any other part of world, having carried more than 1,250,000 passengers in 1919 without a serious accident. Of course there is competition from time to time, as many persons find an apparent opportunity to operate motor buses in competition with established systems, but the competition is not serious and the cars are small in comparison. The tendency of competition of the smaller lines is to assist in handling the peak loads, or the maximum which occurs at certain hours of the day, and in this sense they are beneficial to the city and work no serious harm to the principal system, although there is of course a marked advantage in any city to have the transportation facilities work in as close harmony as circumstances will permit. The smaller competing jitney buses mentioned only carry about ten passengers, are very light in construction and use gasoline for motive power. The regular omnibuses seat thirty-two passengers.

The route of travel of the auto omnibus line of the Rio de Janeiro Tramway, Light & Power Company is 2,100 meters (1.3 miles), from Praça Maua to Passeio Publico. The return distance traveled is the same and along the same route. There are seven coaches, each with a dead weight of about 15,000 lb., employed, having J. G. Brill Company bodies, with Edison or Oxide batteries and four-wheel drive, on chassis of the Commercial Truck Company of America. The maximum in service at one time is four, although all seven may be in service some time during the day.

The power consumed per bus-mile is approximately 2.328 kw.-hr. alternating current or 1.701 kw.-hr. direct current. The corresponding amounts per bus-kilometer would be approximately 1.46 kw.-hr. a.c. and 1.06 kw.-hr. d.c. The amount varies somewhat from month to month. The amount of power consumed is infinitesimal when compared with the total output of the generating plant, amounting to about 0.15 per cent. When charging the direct current is supplied from a 110/150-volt 760-amp. generator, this being driven by a 150-hp. motor. The charging rates are controlled by resistances, and the omnibuses may be brought in to have their batteries charged during the night.

The normal rate of fare on the tramway company omnibus is about 5 cents (United States currency equivalent) and on the private competing buses also about 5 cents; on the tramway itself the normal rate of fare is about 5 cents for the first zone and about 7½ cents for the second zone. These fares are relatively very low in a city where the first charge for one or two automobile passengers is 50 cents for the first kilometer and then 5 cents per 100 meters after that.

The fact that public carriages are practically unknown in the city is in itself a fair indication of the excellent service rendered by the tramways, omnibuses and taxicabs, each type of conveyance encountering very little competition from the other types. The accompanying illustration shows one of the omnibuses of the tramway company near the famous Monroe Palace at the foot of Avenida Rio Branco. It is notable that the so-called "imperial" or second floor so well known in London, Paris and New York is lacking here because of the comparatively short haul and the time lost in climbing up and down. Persons carrying bundles cannot ride in these omnibuses, and it is not permitted that any person ride in a first-class omnibus or tramway coach in Rio de Janeiro unless he is properly clad, with a collar, necktie, shoes and other habiliments generally worn by self-respecting people.

New Heavy Energy Air-Break Switch

HEAVY ENERGY AIR-BREAK SWITCH

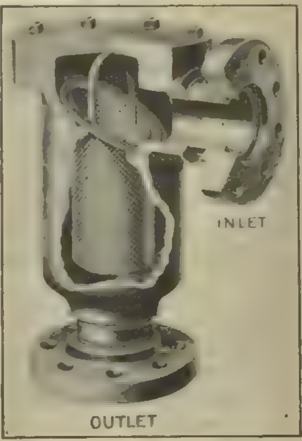
A NEW air-break switch is now being placed on the market by the High-Voltage Equipment Company, Cleveland, Ohio. The switch is designed to break heavy energy loads or line charging currents and is so constructed that the arc is lifted by the horns as rapidly as the switch arm is raised in opening. Any part of the switch can be removed without removing the switch from the pole or substation structure. The insulators are fastened to forged steel pins by threaded steel thimbles cemented into the insulators. The insulators are securely locked or keyed to the pins and can be readily removed by disengaging the locks.

The contact is of the self-adjusting type, which aligns itself with the contact blade. It is covered by a sleet hood and protected against burning by auxiliary contact horns. Among the special features claimed for the design are the elimination of all torsional strains on the insulators and the provision for a great rupturing capacity and an absolute waterproof construction.

Using Up Broken Drills

A NOVEL form of tool holder designed by the Martin Tool Holder & Machine Company of Jackson, Tenn., permits of the use of drill bits and other short lengths of high speed steel as the cutting elements in lathe tools. The holder consists of a block of steel of suitable size in which is drilled a hole in a diagonal position and of a size corresponding to the size of the drill bit to be utilized. The holder being slotted in the axis of the drill allows sufficient flexibility to insert the cutting tool and firmly to clamp it in place by means of the tool post on the lathe. These holders are provided for carrying round bits up to ¾ in. in diameter, in addition to which other holders are made to accommodate bits of square sections of varying sizes.

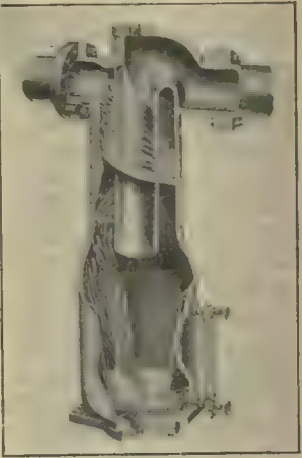
Convenient Strainer Set



NEW TYPE STRAINER

THE various oil discharge lines used in power houses as well as the intake for water supply reqiure strainers. To meet this demand the Griscom Russell Company, New York, N. Y., is marketing a strainer with the construction shown in the accompanying illustration. The body is made of cast iron and the strainer basket of perforated sheet steel and lined with wire mesh when the strainer is to be used on an oil line. This strainer may be installed either as a single unit or as a strainer set. The strainer set consists of two of these strainers connected complete with two three-way valves and necessary connecting elbows, unions and nipples. The set permits the cleaning of either of the two units without interruption of service.

Obtaining Dry Compressed Air


CONSTRUCTION OF AIR SEPARATOR

THE presence of water in compressed air is a source of much trouble, not only in connection with the operation of car equipment but also in the use of air in shops for blowing out and cleaning equipment parts and in operating pneumatic tools. In the usual installations cooling coils are installed between the compressors and reservoirs. These serve to condense the water vapor so that it will be deposited to a certain extent in the reservoir and can thus be drained off.

An air separator for use in freeing compressed air of water is being placed on the market by the Griscom-Russell Company of New York City. The general construction of this separator is shown in the accompanying illustration. The centrifugal force of the moving air is utilized as a means of freeing it from water; as the air and water pass through the separator they follow a helical path formed about a central core, which causes a swirling motion. As water is much heavier than air, it does not take the turns so readily and it is thrown out of the path of the air against the outer wall. From the wall it trickles down slowly and accumulates in a receiver.

This type of separator has been found particularly suitable for use in connection with sand blast machines. Electric railways that sand blast glass or castings have found that water in the air causes the sand to pack and thus prevent free operation.

The Griscom-Russell Company has just published a bulletin, No. 1111, which gives additional information regarding the separator, together with sizes available.

Letters to the Editors

Relation of Tie Life to Track

THE INTERNATIONAL STEEL TIE COMPANY
CLEVELAND, OHIO, Aug. 31, 1920.

To the Editors:

We are heartily in accord with the suggestion contained in your editorial on "Substitute Ties," in the JOURNAL of Aug. 21, that the relation of the tie, of whatever type, to the track as a whole needs to be considered in the light of information made available through the report of the American Railway Engineering Association. To further the tests and investigation along these lines, either by the American Railway Engineering Association or by individual companies, we will be glad to place at their disposal, without charge, our shop facilities and the assistance of our engineers.

For the more complete information of the readers of your editorial, particularly with reference to the Chicago study of results with steel ties, may we state that the steel twin ties were never used in that city?

T. L. LAVAN, Assistant General Manager.

Detroit Does Not Play with the Bus

NEW YORK, N. Y., Aug. 26, 1920.

To the Editors:

If the municipal agitators of the Hylan type, who harp on buses as the sole solution of our surface transportation problems, would pay heed to real economic considerations they would soon realize that the conducting of transportation *en masse* can best be accomplished only by means of vehicles, large in size, safely constructed and run upon rails.

Walter Jackson's recent report on Bridgeport's transportation problems, made to the Chamber of Commerce of that city, does not call for the elimination of the rails. On the contrary, it emphasizes the need for them, just as any sane analysis must do. But the city of Detroit has gone much further than Mr. Jackson in placing the rails where they properly belong in our scheme of transportation. While the Hylan busy buses buzz wherever the courts have not put them out of business, Detroit has gone in deeply for a municipally owned street railway system, tracks and all.

We wonder if Mr. Hylan has heard of this flouting of his pet theory of bus or bust by Mayor Couzens, who may be classed as one of the fathers of the automobile industry. If so, New York's Mayor must be making faces at Mayor Couzens for spoiling the bus propaganda as the best means for pursuing a policy of municipal ownership, down-with-the-street-railways program. This must hurt all the more because both Mayors appear to have the same general object in view—namely, municipal ownership at any cost. Certainly the records of both men make it clear that Mayor Couzens has the better of Mayor Hylan in successful business experience.

The foregoing comments are but a means of calling attention once more to the fact that adequate transportation in great cities must be conducted upon rails, whether in streets, subways or on elevated structures.

It is of interest, while speaking of the busy (?) Hylan bus, to call attention to the Mayor's most recent effort in this line over in Queensborough, where the buses are being run along a 5-cent trolley route (in absence of cars withdrawn because of exorbitant demands of the carmen for higher wages) with a charge of 10 cents for the bus ride. This is in territory where Mr. Hylan refuses to admit that street railways cannot be run at a profit at 5 cents! Where is your 5-cent bus fare slogan, Mr. Mayor?

Some day the people will realize that the way to secure adequate transportation lies in an insistence that our public officers shall cease agitation of impossible economic theories and get down to facts. It is time that the city of New York realized that the real interests of the people are the same as those of the investors in street railway enterprises, and the railways should have a chance to show what they can do with an adequate fare for the service rendered, just as the steam railroads are about to be permitted to do. "COMMENTATOR."

Association News

ATLANTIC CITY CONVENTION, OCT. 11 TO 15

Exhibit Committee's Report Encouraging

THE committee on exhibits for the association's convention to be held in Atlantic City the week beginning Oct. 11 met Wednesday, Sept. 1, at the association headquarters in New York City. Requests for space are coming in rapidly and 90 per cent as much space as was used in last year's convention has already been sold, which is far ahead of the amount sold at this date last year. Reports in regard to the co-operation with the freight departments of railroads and in regard to the haulage and handling of freight in Atlantic City give definite assurance that all exhibits will be handled and moved promptly and speedily.

The following manufacturers have engaged exhibit space, in addition to those listed in the ELECTRIC RAILWAY JOURNAL for Aug. 21: Bemis Car Truck Company, Differential Car Company, Economy Electric Devices Company, Hauck Manufacturing Company, Holden & White, Inc., International Motor Company, Johnson Fare Box Company, R. F. Johnston Paint Company, More-Jones Brass & Metal Company, Naugle Pole & Tie Company, Newark Cornice & Skylight Works, the Rail Joint Company, Safety Car Devices Company, Tool Steel Gear & Pinion Company, Tuco Products Company, Westinghouse Lamp Company, Westinghouse Traction Brake Company.

Additional Bulletins Now Ready

THE following bulletins have been prepared by the association's Bureau of Information and Service and may be had by member companies upon request:

MOTOR TRUCK OPERATING COSTS. This covers both passenger and commercial vehicles.

SUMMARY OF AUTOMOBILE ACCIDENTS. A classified, detailed list of accidents between street cars and automobiles.

FINANCIAL STATISTICS FOR A GROUP OF ELECTRIC RAILWAYS, compared for the first six months of 1920 and 1919.

THE PRESENT SITUATION ON SKIP STOPS.

LIST OF COMPANIES IN THE HANDS OF RECEIVERS; also those abandoned or junked, with details.

In addition to the above, the regular bulletins on fares, wages and cost of living have been brought up to date.

Recent Happenings in Great Britain

Higher Railway and Tramway Fares Considered—Glasgow Lifted to a Paying Basis—Dispute Over American Rail Purchases

(From Our Regular Correspondent)

Something approaching turmoil prevailed among a large section of the public in Britain during July over a proposal by the Government to make a further increase in railway fares. Tramways are not affected, though electric railways, apart from the London "tubes," are. The process of increasing tramway fares goes on in piecemeal fashion in the different localities under existing acts, but the proposal as regards railways was made wholesale for the country at large. It can be carried out in this way as the railways are under the control of the Ministry of Transport till August next year.

I THINK that the public generally recognized the necessity for raising railway fares in order to meet higher costs, but what brought about the storm was that the increase was timed for the beginning of August just when the holiday season was getting into full swing. People said that the change should have been made sooner or else later. The Government did not manage to make the change sooner, and they said that if it was made later the increases would have to be greater, as they are determined to put the railways into a solvent condition by August of next year when full control reverts to the companies.

It was while the Government awaited a report from the Railway Rates Advisory Committee that the agitation reached its hottest. At the end of July the Advisory Committee reported in favor of adding 2d. on the 1s. of all fares, raising the increase to 75 per cent above pre-war level. The previous increase was 50 per cent. The Government adopted the proposal and it came into operation on Aug. 6.

MINISTRY OF TRANSPORT'S GOOD WORK

A remarkable step was taken in July in connection with London passenger transportation authorities, and one that may lead to great benefits in the future. To see the point, it is necessary to bear in mind that the London County Council, as a municipal tramway authority, has always looked with a jealous if not a hostile eye on tramway and omnibus companies doing business in or near London, and has not been particularly cordial even to the underground railway companies. Of late the competition between the County Council tramways and the London General Omnibus Company's vehicles has become increasingly keen and the need for co-ordination more and more pronounced. Now the benefit of the new Ministry of Transport has made itself felt in the matter. The Minister arranged a conference between representatives of the County Council and of the underground group of companies (which includes the omnibus company) with the object of trying to arrive at an agreement for co-ordinating and improving transport facilities in London. As a result of the conference, it was decided to set up a committee on which representatives of both sides will sit with the object of discussing the subject in its widest aspect. Sir Alexander Gibb, of the Ministry of Transport, has been appointed chairman. Something of value should be achieved by this committee, and it may lead the Government to proceed with the scheme for constituting a Traffic Board for London.

HIGHER FARES PROPOSED FOR LONDON

The London County Council on July 27 determined to take the bull by the horns in the matter of preventing the realization of an estimated deficit of something like £1,000,000 on the current year's working of the tramways. They agreed to apply to the Ministry of Transport for sanction under the Tramways (Temporary Increase of Charges) Act to raise the fares to the following level: One section (0.6 of a mile), 1d.; two sections, 1½d.; three sections, 2d.; five sections, 3d.; eight sections, 4d.; twelve sections, 5d.; any further distance, 6d. At present 1.2 miles can be covered for 1d. and highest fare is 4d. Workmen's fares are to be: 2d. return for three sections (3.6 miles double journey); 4d. return for six sections; 6d. return for any further distance. Children's fares: 1d. for three sections, 2d. for eight sections, 3d. for any further distance. The twopenny midday fares for any distance beyond the penny stage are to be retained. It will be noted that the ratio of increase for the shorter distances is enormous.

The effect of the recent increase of fare on the Glasgow tramway system is strikingly shown by some figures issued by Mr. Dalrymple, the tramway manager. It may be recalled that from the beginning of June halfpenny fares were abolished and all other fares raised, though a concession was given by selling twelve vouchers for 9d. covering the old halfpenny stages. The results have been worked out for the months of June and July along with a comparison with the corresponding months of last year. It is found that if things continue as they are now all objects in view will be attained. That is to say, the revenue will increase sufficiently to cover all expenses, and the number of passengers will be sufficiently reduced to remove congestion.

GLASGOW LINES SHOW GAIN

There has been an enormous decrease in the number of short-distance passengers, while the longer-distance journeys have increased. The total traffic revenue for June and July this year was £368,938, compared with £273,473 in the corresponding months of last year. Passengers numbered 70,067,073, against 79,708,560. The miles run were 4,515,634, against 4,352,536. The receipts per car mile were 19.61d., compared with 15.08d., while the passengers per car mile numbered 15.52 against 18.31. Provided no further increases take place in wages and the cost of materials, the Glasgow tramways appear once more to be on a sound economic basis.

AMERICAN RAIL PURCHASE ATTACKED

The question of placing orders in the United States for tramway rails has again arisen in acute form in Glasgow. On July 29 the Tramways Committee brought before the Town Council a proposal to order from the United States Steel Products Company 10,000 tons of rail at £23 10s. a ton. The only British tender was £28. Much feeling was displayed against placing the order abroad. A labor member alleged that the American firm did not conform to trade union conditions and asked if a special guarantee as to those conditions required by the standing orders from foreign firms had been obtained. The chairman of the committee said that no special guarantee had been received, but the firm had signed the usual contract clause relating to standard rates of wages. The town clerk said that the contract was admittedly not in conformity with the standing orders. The Council unanimously agreed to send the recommendation back to the committee for further consideration. Early in August the committee resolved to reaffirm its recommendation, considering that the American company's statement as to conditions of labor was satisfactory and to proceed with the purchase.

TRACK EXTENSIONS COSTLY

The work of renewal of tramway track fell heavily into arrears during the war in other towns as well as Glasgow, and now the arrears have to be made up at heavy post-war prices. An example of what this means is given by the case of Liverpool. The city engineer has put forward a scheme of reconstruction to be spread over five years, and its estimated cost is £864,197. Over 60 miles of track are involved. There is a further estimate of £331,000 for renewal of rolling stock and overhead equipment.

The magnitude of the problem involved by the continued rise in wages is illustrated by the case of the London underground group of railways, which includes the General Omnibus Corporation. It is estimated that the wage bill for the current year will amount to more than £6,000,000. In 1913 it was only £2,000,000. As to taxation on the London omnibuses, the company pointed out that hitherto it has been £63 per annum per vehicle, while under the new finance proposals of the Government it will be £84. The tax hitherto on petrol is converted to a tax on engine power.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

St. Paul Strike Averted

Council Passes Fare Measure Which Is Expected to Provide Funds to Increase Wages

Through the passage of an emergency ordinance by the City Council of St. Paul, Minn., granting a 6-cent fare to the St. Paul City Railway, a threatened strike by trainmen was averted. The ordinance was drawn by E. W. Bemis, Chicago, and Corporation Counsel A. E. Nelson. The ordinance becomes effective on Sept. 13 if the company shall actually furnish the service as prescribed in the service ordinance. With the fare increase the trainmen get the wage increase of 10 cents an hour such as had already been granted in Minneapolis, retroactive to July 20. This will cost the company about $41,600.

Conditions of New Ordinance

The new ordinance provides that the railway shall add fifteen cars to those already in service before Sept. 13; that the company shall add four cars each week until a maximum has been reached that will provide for carrying all passengers from any point on the lines during the peak of the traffic and not average more than eighty-five persons to the car; that the average shall be computed on number of cars passing a given point in any fifteen-minute period of the day, and that except between 6 a.m. and 9 a.m. and 5 p.m. and 7 p.m. the company shall provide enough cars for every passenger to have a seat. The company must make reports before the first and fifteenth of each month showing revenue, expenses and net earnings.

In his preliminary report E. W. Bemis said that a 6-cent fare was necessary if the trainmen were to get an advance in wages and service were to be improved. Mr. Bemis is serving as utility expert for the city in making a valuation of the physical property of the company.

Back Pay for Minneapolis Men

Back pay for Minneapolis employees on the basis of the new schedule from July 16 to Aug. 16 is being figured for about 2,000 men, carrying out the recommendations of an arbitration committee, whose report averted a strike in Minneapolis. The distribution in Minneapolis will be about $65,000.

When Minneapolis allowed the Minneapolis Street Railway to advance its fare to 6 cents, for the first time in thirty years the systems of the Twin Cities were separated. An order was issued to make the city limits the fare limits, 10 cents being the fare between the two cities. Upon protest by the City Council this order was canceled as to change of fare limits, which now include a neutral zone in St. Paul permitting a passenger to ride for 6 cents from any point in the city of Minneapolis to Snelling Avenue, more than 2 miles.

Caring for Neutral Zone

The Council of St. Paul has been notified that an ordinance will be submitted abolishing that zone. Meanwhile business interests in the midway neutral zone are up in arms against the proposed change on the ground it will work a hardship on Minneapolis residents employed in the midway district, who now pay a 6-cent fare, but would have to pay 12 cents if the zone is abolished.

Board Reports to Governor on Labor Differences

Governor Alfred E. Smith has received the report of the State Labor Board, which made an investigation into the differences between the International Railway, Buffalo, N. Y., and its employees. After reviewing the report, Governor Smith is expected to name the third member of the board which is to adjust the grievances of the employees.

The board informs the Governor that the traction company is willing to have the arbitrators decide a scale of wages, but the scale should not be retroactive as to May 1, 1920, as demanded by the men. The company contends that if a schedule of wages higher than the maximum of 60 cents an hour granted by the International Railway is decided upon, the new pay schedule should not become effective until the Public Service Commission grants a higher fare to absorb the wage increase.

In a statement to the public, H. G. Tulley, president of the International Railway, says that if the board of arbitration decided that the men are entitled to a higher wage and no further increase in fares was authorized by the state utilities board, the company would be forced to curtail service. A similar statement was made by Elliott C. McDougal, chairman of the bondholders' protective committee, which is planning the financial reorganization of the company.

There has been a good deal of discussion over the mechanics of the settlement, but the negotiations have been conducted with the best of spirit prevailing.

New Orleans Hearings Close

Finding of Commission Inquiring Into Company's Affairs Likely to Go to City for Final Decision

The fourth week of the hearing before the special masters appointed by Judge Rufus E. Foster, of the Federal court, to solve the railway problems of New Orleans, gave promise of terminating with the Federal Judge himself on the stand. A peculiar incident of this new development in the controversy was the fact that Judge Foster has the final word in the Federal receivership of the New Orleans Railway & Light Company, and that the conclusion reached by the special masters, who have been hearing testimony in the matter, will have to be approved by Judge Foster himself before becoming effective.

Question of Employees Included

The question which the contending parties in the controversy desire Judge Foster to answer is whether or not, at a conference in the judge's office on June 28 between the officers of the railway union and those of the railway company, Judge Foster did or did not state that any contract entered into between the employer and employee would or would not include all the employees enrolled under the Amalgamated Association.

The company contends that under Judge Foster's instructions the contract was to include only platform and carhouse men and was to be exclusive of gas, track and other employees not operating street cars. It is expected Judge Foster himself will be asked to settle this point.

The prevailing opinion among those qualified to speak is that whatever finding is reached by the special masters and approved or amended by Judge Foster will have to be referred to the Commission Council, as it is not unlikely that an increase in fare will be recommended. Should this be done, final disposition of the matter will be left to the new Commission Council to be elected on Sept. 14. The present Commission Council is not disposed to act in view of the very bitter municipal election contest now pending.

Hearing Near Close

The hearing before the three special masters was expected to come to a close during the week ended Sept. 4. This is the fifth week since resumption of service by the trainmen under the "arbitration agreement." The five weeks during which the pay award will be retroactive expired on Sept. 2.

Brooklyn Men Strike

Quit Work on Wild Rumor Proved by Company to Be Unfounded—Surface Trainmen and Elevated Guards Out

Residents of Brooklyn were victims last week of an outlaw strike of the employees of the Brooklyn Rapid Transit Company. The strike became effective Sunday morning after two turbulent meetings of the employees had been held, at the second of which the men decided by acclamation to go out. At the early meeting order was preserved with great difficulty, and the men were urged by their officers and by Mayor Hylan to postpone action until further efforts toward an adjustment of the so-called grievances could be made. The Mayor retired from the meeting assured that the matter would go over. When the second group of employees convened, however, an unconfirmed report of a lock-out at one of the power stations had the effect of stampeding the meeting for a strike. Officials of the Amalgamated at a subsequent inquiry before the Public Service Commission admitted that the association's code of procedure provided for a secret ballot on the matter of a strike and that no effort had been made to confirm the lock-out story, but the organizer in charge at the meeting said that a secret ballot had not been necessary, as the members at the meeting had decided unanimously to go out. All of the Sunday newspapers contained stories to the effect that further negotiations would be carried on.

ON MONDAY afternoon the Public Service Commission began an inquiry into the strike situation under its powers of inquiry into situations in which service is curtailed or discontinued. The principal witnesses were Lindley M. Garrison, receiver of the railway, and Patrick Shea, organizer of the Amalgamated. Mr. Garrison reviewed the conditions existing previous to the strike of a year ago and cited from the text of the agreement of Dec. 16, 1919, between the company and the men. He said that in 1919 a committee which purported to represent the employees presented the demands of the men with regard to wages, reinstatement of the men, who had been discharged, recognition of the union and an eight-hour day. He denied at the time that the committee which presented these demands represented the employees. A deadlock resulted and the men struck. The strike was settled under an agreement to the effect that if it appeared that the Amalgamated had enrolled more than 50 per cent of the men on the Brooklyn Rapid Transit System, Mr. Garrison would negotiate with them and settle by arbitration any differences that could not be adjusted in conference. As a result many new demands were added to the four presented originally by the men, but these were all disposed of in conference without resort to arbitration. Finally on Dec. 16 a written agreement was signed covering the settlement.

Mr. Garrison referred particularly to sections 2 and 3 of this agreement. They are as follows:

> The receiver will receive the committee presenting the grievances, and take the same up with such committee, and with such advisers or counsel as such committee selects.
>
> In the event that such grievances or any which may hereafter arise cannot be adjusted by and between the receiver and the committee, they will be arbitrated by a board to consist of P. J. Shea or his nominee, and Lindley M. Garrison or his nominee and if necessary by a third member to be mutally agreed upon by said Shea and said Garrison; and in the event of said Shea and Garrison being unable to agree upon a third member, and so stating to Mayor Hylan and Commissioner Nixon, the two gentlemen last named shall thereupon designate the third arbitrator.

Mr. Garrison pointed out that there is no provision in the contract for subsequent arbitration. He also quoted from paragraph 12, which is as follows:

> The terms and conditions of this agreement will remain in effect until July 28, 1920, and thereafter until terminated as herein provided. Any company or the receiver of any company, party of the first part to this agreement, may terminate the same so far as it affects such company or such receiver, by giving thirty days' notice in writing at any time after July 28, 1920, to the committee of such intention, and the committee, party of the second part, may terminate this agreement, by giving thirty days' notice written at any time after July 28, 1920, to each of the parties of the first part, of such intention, and this contract shall so terminate thirty days after the giving of such notice by either or any party. If either or any party shall desire to make changes in this agreement on or after July 28, 1920, during the continuance hereof it is understood that the party desiring such changes shall, on or after that date, give thirty days' previous written notice to the other party or parties, specifying the changes desired, and, if mutually agreed upon, such changes shall be incorporated in a new agreement.

What the B. R. T. Men Demand

For surface motormen and conductors, from 84 cents to 92 cents an hour. The present scale is from 52 to 62 cents an hour. For Sunday and holiday work, 10 cents extra an hour. A six-day week and a twelve-hour rest period after each day's work.

For elevated conductors, 87 cents to 90 cents an hour. The present rates are from 54 to 57 cents. For guards on the elevated and subway lines from 82 to 85 cents an hour. The present pay is from 49 to 52 cents an hour.

Mr. Garrison stressed the clause about the thirty-day notice. He said that on July 24 Mr. Smith of the committee requested an interview for July 27. Mr. Garrison's reply was that Mr. Smith was in error about the expiration of the contract, but said that if the committee would state its conditions he would consider them. According to Mr. Garrison new agreements were suggested by the men, not modifications of the present contract. Among the obnoxious requests was the closed shop and the collection by the company of union dues. Mr. Garrison wrote in substance that the conditions were not changes but were new documents. The men then appealed to the Mayor to ask Mr. Delaney, the Transit Construction Commissioner, to confer with Mr. Garrison. Mr. Garrison wrote Mr. Delaney that he could not, under instructions from the court, consider the closed shop, but he was willing to take under consideration other matters mentioned.

Later Mr. Garrison was asked by Mr. Delaney if he would make a tacit understanding with the men if section 55, which was repugnant to the receiver, were eliminated. To this Mr. Garrison replied that he would not enter into any tacit agreement. Mr. Delaney then informed the receiver that the men had withdrawn the objectionable clause. The correspondence clearly indicated, however, that the men had not abandoned hope of the closed shop.

Shortly thereafter the matter was taken up with Judge Mayer. The judge agreed to modify his stipulation that in any arbitration the third member of the board should be a jurist, but insisted upon his right to review the arbitration finding with respect to wages if the award of the arbitrators should be beyond the financial ability of the company.

Mr. Garrison then asked Mr. Shea if he would negotiate on the basis Judge Mayer laid down and Mr. Shea said that the matter would have to go to the men. That was Mr. Garrison's last real knowledge of the situation. After that the question was taken up by the men direct with Judge Mayer. As a result the judge reiterated his previous stand.

Mr. Garrison told Deputy Commissioner Barrett, who conducted the inquiry, that the men had broken their contracts by going out and had also broken their faith with him. He had no real notice of a desire on the part of the men for the termination of the contract—a contract that could be terminated at the wish of either party on thirty days' notice.

Counsel Fridiger for the union asked Mr. Garrison whether he did not know that there was no legal obstacle to entering into arbitration. Mr. Garrison's reply was the matter rested with Judge Mayer. He was testifying to facts. He insisted that he had kept his agreement. Mr. Fridiger quoted clause 3 of the agreement. Mr. Garrison insisted that this clause related only to the settlement agreement of last year. Mr. Fridiger insisted that clauses 2 and 3 of the agreement of Dec. 16 were still operative. Mr. Garrison said that changes in the contract of Dec. 16 had never been asked. There had been, however, insistence from the men upon the acceptance of three new agreements.

Mr. Shea for the union testified, as before related, to the events which took place at the meeting by which the strike was decided upon.

Mr. Barrett explained the peculiarity of the case at some length, the road being in receivership, and said that he felt Judge Mayer, by whom Mr. Garrison was made receiver, would not be likely to modify any findings of an arbitration board that were at all reasonable.

In the interest of everybody concerned, Judge Mayer, late on Aug. 31, restated his position with respect to the matter of arbitration. This he did as a result of the conference attended by the Mayor and other members of the Board of Estimate, the Corporation Counsel, Mr. Garrison, Mr. Garrison's counsel and the judge himself. In his own words the conditions as restated by Judge Mayer follow:

> In regard to working conditions, I am willing to have the receiver submit to arbitration the working conditions contained in the agreement proposed by the men, except those which the men have heretofore withdrawn.
>
> In regard to financial questions, my position is stated in my letter to Receiver Garrison, dated Aug. 25, as follows:
>
> I am willing that there shall be a submission to a board of arbitrators of the financial question involved in the requested increases and that the fullest opportunity be accorded to such board to ascertain the financial condition of the receivership. It must be understood that any and every award must be within the financial ability of the particular receivership to meet, and for this purpose the court must retain the right to restrict any and every award within such limits.

On Sept. 1 the men voted to reject the court's proposal for returning to work. They did, however, empower their representatives to present to the court the following propositions:

> That Judge Mayer submit all questions, except those of a financial nature, to an arbitration board with the agreement to abide by the board's decisions.
>
> That Judge Mayer make the men an offer of a flat wage increase over the wage scale that the men were receiving last Saturday just before they went out.

Mr. Garrison regards the strike of the surface trainmen and the elevated conductors and guards as a revolt. This was his characterization of the situation to the newspaper men when he saw them on Sept. 1. He pointed out that all the public officials had told the men they were in the wrong. The men had run amuck. Good faith was the basis of American life. This the men were seeking to destroy. He said the public should realize that the present controversy in Brooklyn was more than a dispute between employer and employee.

As regards service a few two-car rapid transit trains were run on Sunday. On Monday more than forty two-car trains were run on various branches of the elevated and rapid transit lines. On Tuesday more than seventy three-car trains were in operation and there was some service on all the subway and rapid transit lines. On Wednesday morning the company resumed service on the surface lines with seventy cars and planned to increase both rapid transit and surface-car transportation just as fast as it was physically possible to do so.

Ceremonies Attend Municipal Construction

Active Construction of Detroit's New Lines Started When Mayor Drives First Spike

The first spike in Detroit's Municipal Street Railway was driven by Mayor Couzens on the afternoon of Aug. 23. Work was started on the south track on Harper Avenue, where the Detroit United Railway is also constructing a line on the private right-of-way which it owns on the north side of the street. Carhouse sites have been considered and specifications for cars are being studied. If electricity is used as motive power current for the city's lines will be supplied by the Detroit Edison Company.

PARALLELING the efforts of the Street Railway Commission to add to the railway facilities, the Detroit United Railway, according to its publicity department, has built since the first of the present year sixty-five new motor and trail cars in its Highland Park shops and added them to the service on the Detroit city lines. By Jan. 1, 1921, the company expects that at least thirty-five more new cars will have been completed and added to the service, making a total of 100 or more new cars than were in service at the beginning of 1920.

150 NEW CARS UNDER WAY

The company's car construction program for the coming year contemplates the construction of 150 new motor and trail cars in the company's shops. Other cars are to be purchased from outside manufacturers. Some of the new cars will be of the so-called Peter Witt center entrance type.

Petition has been filed by the Detroit United Railway in the United States Supreme Court for a permanent injunction restraining the city of Detroit from proceeding with its municipal lines. This appeal from the decision of the United States District Court is based upon the claim that the election authorizing the $15,000,000 bond issue to build city-owned lines was illegal. The company contends that the bond issue was invalid.

The judge in the District Court held that the city still had the right to oust the company from Fort Street, its franchise having expired, but it was admitted by city attorneys that under the ordinance of April 5 the city could only construct new lines with the $15,000,000 voted and not take over any of the Detroit United Railway's lines.

COURT PROCEDURE LIKELY

Legal steps are also expected in opposition to the city's order issued to the Detroit United Railway directing the removal of the tracks on St. Jean Avenue, where the company started construction a short time ago. In reply to the order that tracks be removed within ten days to allow the city to construct its own line, the Detroit United Railway officials stated that the matter had been referred to their attorneys for action. According to Corporation Counsel Wilcox, the city cannot be prevented by the Detroit United Railway from putting a municipal line on St. Jean Avenue. It is claimed that the line on St. Jean Avenue built by the company is not much used, it being only a relief line from the carhouse while the city is ready to construct its line over the same route.

The original proposal by the company was to build the loop, Elizabeth-Withual Street loop, and enter into an agreement that would protect the rights of the city. The Corporation Counsel maintains that the city has the right to go ahead with the work, but to allow the Detroit United Railway to build it would give the company the chance to use the loop as a basis for claims of new rights in Woodward Avenue where its franchises south of Pallister Avenue have expired. Similar claims were set up by the Detroit United Railway in the case of the Fort Street line when the company argued in court that the permit to do repair work gave it new rights where franchises had expired.

The Corporation Counsel and the City Comptroller both hold that it is lawful for the city to use tax money for financing the municipal street railway line, but that it is not intended to do so. In the suit brought by the Detroit United Railway to enjoin the city from using the city sinking fund for the Municipal street railway bonds, the Comptroller stated that the larger part of the bonds bought by the sinking fund commission had been sold to the public. It was stated that the sale to the sinking fund commission was only tentative to ascertain just what interest it would be necessary for the city to pay under present conditions. Further argument of the case has been postponed.

COUNCIL LACKING IN AUTHORITY

That the Council lacks the authority to change the routes designated in the municipal street railway ordinance adopted on April 5 unless the substituted lines are constructed from sources other than the $15,000,000 voted, is the opinion of the Corporation Counsel, voiced in answer to protests against the construction of municipal lines in front of their houses, made by residents of streets along which it is planned to run one of the city lines. The fact was brought out by the Corporation Counsel that ample opportunity for protests had been allowed between Nov. 4, when the ordinance was introduced, and the election on April 5. It was stated that a provision whereby the Council was allowed to change the routes had been deliberately withdrawn from the final draft of the ordinance, in order to avoid criticism that the people were voting for a system which might be changed for some other system of lines when the actual time came for construction work.

Philadelphia Welfare Association Picnic

Mr. Mitten Encourages Thrift Program—Sees Universal Return to 5-Cent Fare and Lower Wages—Co-operative Program Successful

The second annual picnic of the Co-operative Welfare Association of the Philadelphia (Pa.) Rapid Transit Company was held at Willow Grove Park Aug. 31 and Sept. 1. It was followed by a dinner on the evening of Sept. 1 given by T. E. Mitten, president of the company, to all the Co-operative committeemen, representatives selected by the employees and a like number of representatives appointed by the company. Almost 500 guests sat down at the president's dinner in the large casino in the park.

PRACTICALLY all of the 11,000 employees of the company with their families participated in the festivities of the two days' picnic, the total attendance for the two days being estimated at 75,000. Well-organized picnic committees had arranged an interesting series of events, among which stood out prominently baseball games and other sporting events. Sousa's band, now at Willow Grove Park, added an especially enjoyable feature and Billy Sunday's Rodeheaver kept the crowd singing when there was nothing else to do, his favorite song, "Brighten the Corner Where You Are," being frequently heard. A nine-weeks-old band, organized among the employees, was a drawing card.

Interest in "Get Together"

Great interest centered in the "get-together" meeting late in the afternoon of Sept. 1, when President Smith of the Co-operative Welfare Association, President Jackel of the Co-operative Saving Fund and President Mitten of the company all addressed the assembled members and their families. President Smith announced that more than 99 per cent of the employees of the company were members of the association. President Jackel announced that the employees' savings were going into the Saving Fund at the rate of more than $1,000,000 a year. Eighty-five per cent of the employees are Saving Fund depositors, and it developed that of the other 15 per cent 14.2 are so heavily loaded with building and loan association obligations that they cannot carry both, leaving some 0.8 per cent of the employees of the company who may be said not to be following any organized or systematic saving scheme. A description of the Saving Fund scheme was given in last week's issue, page 421.

Stotesbury Cups Awarded

President Smith awarded the Stotesbury cups to the departments having the highest percentages of employees enrolled as members in the association, the first prize going to the transportation department and the second to the electrical department. A large number of prize banners were awarded to various divisions.

Mr. Mitten directed his remarks of the afternoon largely to the wives of the employees, urging them to maintain their record for thrift. He urged the families to plan to save the 7½-cent differential, current payments of which the employees have consented to have deferred, and not to establish a 72½-cent scale of living; rather to maintain the present 65-cent scale of living and saving. He predicted that there will be a drop in fares and wages in other cities, automatically returning the Philadelphia men's 65 cents under their agreement, for which they would be prepared, and in addition would have a nest egg for the future.

In his evening address Mr. Mitten referred to this again, saying:

> I don't see how fares can stay up the country over. We have built up a 65-cent-an-hour wage by hard work and without raising our fares, while in other cities, when they get back to the 5-cent fare, their wages based on a fare higher than 5 cents will have to drop accordingly. In the meanwhile we shall be able to hold the 65-cent wage on the nickel rate.

He then touched on the money due the men in the deferred wage increase, which is retroactive to June 1.

> We are waiting for that money, and we are going to get it, because no community, after it once recognizes what this organization of men means; when it compares what we are giving Philadelphia in peace, in good service; when it compares that with the things that are happening in our neighboring cities, and which have been happening ever since the war began; when they take time to think that their cars ran in war-times, while the cars of other cities were being held up because of disagreements between men and management; when they see that we are the one city that has doubled the rides in the last ten years—doubled the rides that each person in the population takes each year—do you get that?—will refuse to pay the cost.

Zone System Coming

Indications of the application of a zone system in Philadelphia were made by Mr. Mitten in referring to the necessity and ability of the company to obtain more revenue. He spoke as follows in this connection:

> We don't care what anybody else did and failed; that is no mark for us; if it is right we will do it, and there is no such word as fail.
>
> We have set a mark in co-operation. We may yet set a mark in our method of properly collecting from our passengers what they should pay for what they get. If any man knows that he is paying for what he gets proportionately with every other man, while he may kick and object at the outset, he knows full well that it is right and that he properly should pay just in proportion to what the other fellow pays.
>
> Therefore, having established that principle, if we do, and made it practical of operation, I haven't any doubt in the world that you men can make it comfortably effective to the people you carry, no matter what failures there are anywhere else.
>
> What other people do is no measure for us at all in our method of operation any more than the degree of co-operation between men and management here can be measured by what we see elsewhere. When the method has been determined it will be made known to you; it will be explained to you, and then we will say, "Its right, let's show America how perfect this machine can be made to work."

Mr. Mitten praised the "smiling program" which the men are now carrying out 100 per cent. He said he credited the increased riding habit in Philadelphia to the attitude of the men.

Mr. Mitten was followed by various chairmen of the committees, who without exception gave praise to Mr. Mitten's management and to the co-operative spirit and resultant fine feeling among all the employees of the system. Other features of the evening were the rousing welcome given to H. G. Tulley, now of Buffalo, and musical numbers, including some more singing under Rodeheaver's leadership. One of these numbers was the following song, sung to the tune of "Oh, What a Pal Was Mary":

Oh, what a pal is Mitten,
Oh, what a pal is he,
He came from the West.
And gave his best
In handling the P. R. T.
"Keep down the fares," his motto;
Improve all along the line.
This is his pride,
Five cents a ride.
Oh, Mitten, a pal of mine

Denver Strike a Memory

Strike Breakers All Leave Denver—Old Men Make Overtures to Return to Work

All strike breakers on the lines of the Denver, (Col.) Tramway were replaced on Aug. 31 with new, permanent employees. Except for a few men, every strike breaker has left town. F. W. Hild, general manager of the tramway, who has been out of town on a vacation after a strenuous month, has not yet received the latest proposal of the union. This plan is that the men return in a body with full seniority rights.

Labor leaders are in a row over repeated assertions that they have proposed that the City Council grant a 7-cent fare, provided the strikers are taken back in a body and given a slight wage increase. A City Councilman stated that the president of the State Federation had asked him if he would favor a 7-cent fare on condition that the strikers be reinstated with their seniority rights.

The free jitneys started by the Amalgamated to compete with the Denver Tramway were discontinued on Sept. 1, and the union men were told that they could once more ride the street cars. William J. Lynch, who had charge of the bus lines, said:

> We find we were hauling about 25,000 persons daily, mostly during the tramway rush hours. This was a great help to the Denver Tramway in the effort to give what it claims to be giving, namely, normal service.

The Union took in $5,500 during the eighteen days it operated the buses and paid out $2,800 for oil and gas, $3,000 for tire repairs and $3,800 in wages. Mr. Lynch insists that bus lines would make money on a 5-cent fare in spite of the fact they lost money while getting gratuities of 10 cents to 50 cents from each of their union passengers. The discontinuance of jitney service was due to the need of money for strike benefits and was coincident with the removal of all strikebreakers from the city.

Col. C. C. Ballou, military commander of Denver, is conducting an investigation of the termination of jitney operation, intimating there might be more behind the cessation of service than appears on the surface. He states that a more careful guard will therefore be maintained over cars in operation.

Major General Wood returned to Denver on Aug. 27 and conferred with city and state officials and Col. C. C. Ballou, military commander of Denver. General Wood stated that he would make no further effort to settle the strike "since the situation has apparently passed the talking stage; both sides in the controversy seemed to have settled down with the determination to settle the thing in their own way, and there doesn't seem to be much that we can do in the way of settlement."

In spite of the protests of the State Federation of Labor, soldiers continued to ride the cars as guards.

Waiving the question of wages and the working agreement at this time, strikers on Aug. 29 decided to offer to return to work on the same basis as of July 31, 1920. The offer was placed in the hands of G. Y. Harry, federal mediator, to present to General Manager Hild. Inasmuch as the company now has more than 800 of the 1,150 men needed to operate the system and is holding firm in its previous decision to refuse to discharge any new, permanent employees to make room for strikers, the strike situation remains deadlocked.

The action of the mass meeting on Aug. 29 was the first modification of the strikers' demands. The wage question and the working agreement demands have been dropped.

Arrangements are being made by Gov. Oliver H. Shoup to revive the state constabulary, on recommendation of General Wood. This body will be used to assist the largely augmented police force for riot duty and maintaining order. It was expected that the federal troops will be removed from Denver some time after Labor Day.

On Aug. 31 the last of the temporary employees were sent out of town. Central Division, the most important of the four divisions of the company, is in charge of permanent employees. New men are now operating the entire tramway system and giving about 75 per cent normal service in morning rush hour, through the day, and at night.

Wants Special Legislative Session to Consider Trolleys

Lucius S. Storrs, president of the Connecticut Company, visited Marcus H. Holcomb, Governor of the State, on Aug. 31, requesting the Governor to have the special session of the Legislature which convenes Sept. 14 consider the plight of the trolley companies. The Governor did not announce his decision in the matter, but those close to him said that it was probable that the trolley situation would not be considered by the Legislature, which is called for the purpose of making the women of the State eligible to vote in the November elections, in accordance with the provisions of the suffrage amendment.

Des Moines Strike Settled

Temporary Six-Cent Fare Ordered, With Additional Revenue to Go to Employees

Following the strike order of Monday morning Aug. 23 the employees of the Des Moines (Ia.) City Railway turned their cars into the carhouses at 1 o'clock Tuesday morning and not a wheel turned until the following Thursday morning. An agreement to return to work was reached at a conference of several hours between attorneys and officials of the railway with the executive committee of the striking employees. The settlement was made on the basis of Judge Wade's order of Saturday that a 6-cent fare be charged for a period of not to exceed ninety days, the additional revenue to the company to be applied to the 70-cent wage scale and the remainder to paying the back wages which result from the arbitration award dating back to March 1.

UPON receiving word that the men had gone on strike Judge Wade hurried to Des Moines from his summer home in Minnesota and issued an order which abrogated the present working agreement between the company and the men, and authorized the receivers for the Des Moines City Railway to cease attempts at operation and to release all men except those necessary to care for the property.

STATE FAIR WEEK

Judge Wade's order specified that no strikebreaker would be brought to Des Moines to operate the cars and put it directly up to the city and the men to come to terms if Des Moines was to have service. The regular afternoon editions of the city newspaper on Wednesday came out with stories to the effect that Des Moines would apparently be without railway service indefinitely, but extras appeared on the streets shortly after five o'clock bearing the cheering news that an agreement providing for the settlement of the matter had been reached.

Des Moines faced the strike at a most inopportune time as the Iowa State Fair opened Friday, and it is the mecca for thousands of Iowans for a week. As soon as the strike was declared, however, hundreds of jitneys were on the streets and for two days business was practically at normal.

Upon arriving at an agreement with the railway officials the executive committee of the union waited upon Judge Wade and asked that they be allowed to reconsider their action in striking. They were advised that if they could arrive at an agreement with their employers which would meet with his approval he would order them being placed back on the cars.

NO REAL OPPOSITION

The strike demands were entirely upon the basis of the back pay, and upon the assurance from the company that they would be paid as rapidly as the 6-cent fare would produce the necessary funds, the men agreed to return. It is understood that the back pay will be paid in monthly installments. Officials of the company have stated that unless the 6-cent fare is enjoined the back wages should be cleared up by Jan. 1.

While there have been numerous anonymous rumblings from so-called protectors of the city's rights, as yet no real effort has been made toward interfering with the 6-cent fare ordered by Judge Wade.

Boston "L" Adopts Pension Plan

The Boston (Mass.) Elevated Railway has recently adopted a pension plan for the benefit of faithful employees. The company will appropriate money for this purpose, but no contribution will be accepted from any employee. There are three classes eligible for the pension as follows:

Class A includes all employees whose age is sixty-five or over (females sixty or more) and whose term of employment has been twenty years or more.

Class B includes all employees whose age is sixty to sixty-four (females fifty-five to fifty-nine) and whose term of employment has been twenty-five years or more.

Class C includes employees whose age is less than sixty (females less than fifty-five) and whose term of employment has been thirty years or more.

The term of employment in each case means continuous service with the Boston Elevated Railway or predecessor companies with no break except through illness which cannot exceed six months to be credited.

Employees in Class A may retire at their own request or at the discretion of the committee on pension, but employees in Classes B and C can only retire at the discretion of the committee.

The annual amount of the pension is not to exceed $2,000 or be less than $300 a year. The amount is to be arrived at by taking 1 per cent of the average yearly earnings for the ten years prior to retirement, times the number of years continuously employed.

A general provision is made that the board shall have the right to annul, alter or amend in any way any and all of the provisions contained in this plan.

Investment Bankers Meet

The ninth annual convention of the Investment Bankers Association of America will be held at Copley-Plaza Hotel, Boston, Mass., on Oct. 4 to 6, inclusive. There will be two sessions each day, the second session on Oct. 4 and Oct. 6 being held in the afternoon and that on Oct. 5 in the evening.

The report of the public service securities committee will be presented on the evening of Oct. 5.

News Notes

Cloudburst Stops Operation of Cars.—As a result of a cloudburst on the evening of Aug. 22 the power house of the local line at Springfield, Ohio, was flooded and the operation of all cars stopped. About 1,000 ft. of the Ohio Electric Railway track was washed out.

Fifteen per Cent Wage Increase.—Employees of the Toledo, Bowling Green & Southern Traction Company, Toledo, Ohio, have been granted a 15 per cent increase in wages under new contracts signed up recently. The men had asked for a 40 per cent increase and threatened to tie up the lines.

Winnipeg Men Join O. B. U.—At a meeting on Aug. 27 the employees of the Winnipeg (Man.) Street Railway decided to cease existence as an independent organization, and voted for direct affiliation with the One Big Union. The latter body is a merger of practically all working trades unions in the city of Winnipeg.

Wage Settlement Negotiations Continue.—The motormen and conductors in the employ of the Berkshire Street Railway, Pittsfield, Mass., have rejected the two offers of C. Q. Richmond, general manager, on the settlement of the wage dispute. Mr. Richmond offered a flat 15 per cent wage increase on arbitration with the Berkshire district court judges as arbitrators. Conferences looking toward a settlement will continue.

Ninety-five Cents an Hour Wanted.—The employees of the Boston-Worcester Street Railway have presented a new wage demand asking for 95 cents an hour for conductors and motormen. They are paid 52 cents an hour now. A year ago last June the men struck and were out a day in a demonstration against what they termed "the delay of the War Board." That strike was ended by advancing the pay to 52 cents an hour from 47 cents.

Ten-Cent Increase in Wages. — Employees of the Hartford & Springfield Street Railway, Warehouse Point, Conn., will hereafter receive 55 cents an hour for their services, it is announced by Harrison B. Freeman, receiver for the company. The men were formerly paid 45 cents an hour. In order to prevent friction with the Hartford men, the pay of the employees who run the cars from East Windsor Hill to the town line at Windsor will be paid 60 cents an hour.

City and Suburban Men Want More.—The trainmen of the Cincinnati, Newport & Covington Railway, Cincinnati, Ohio, are seeking an increase in wages. The old contract provided for a wage scale of 45 cents an hour for the first three months; 48 cents an hour for the next nine months and 50 cents an hour thereafter. The scale under the proposed contract is 85 cents for the first three months, 88 cents for the next nine months and 90 cents thereafter. The men also put in a request for straight day work.

Five per Cent Wage Increase.—An increase of 5 per cent in wages to the employees of the Newport County Electric Street Railway, Boston, Mass., has been announced by the Board of Arbitration, composed of Robert S. Goff, Henry Lloyd Rooney and Patrick H. Forgan. The men will hereafter receive a minimum of 48.4 cents and a maximum of 53.3 an hour. These lines were separated from the rest of the Bay State Street Railway System when the public trustees took control of the property.

Increase for Municipal Employees.—Conductors and motormen employed on the municipal street railway lines of the city of Tacoma, Wash., have been granted wage increases, giving them a wage equal to that of the trainmen of the Tacoma Railway & Power Company. The new scale provides a 5-cent raise for beginners, or from 55 cents to 59 cents; an increase of 4 cents for those employed six months, and for those who have worked two years a 3-cent increase, or 63 cents. Commissioner H. Roy Harrison states that he will try one-man cars on the line.

Mr. Damon Presents Terminal Plan for Los Angeles.—George A. Damon, in behalf of the City Planning Association of Los Angeles, Cal., has presented to the California Railroad Commission a substitute plan for a rapid transit and trunk line terminal. Other plans under consideration by the commission include those of its engineer, Mr. Sachse, and of the railway companies themselves. Mr. Damon's plan would include the combining of the Southern Pacific and Salt Lake passenger business in the present Arcade Station and the construction of the proposed Pacific Electric viaducts and elevated tracks toward Long Beach, the shore resort, as well as preparation of plans for a completely unified and electrified railroad terminal.

Ohio Electric Railway Men Get Increase.—An agreement was signed on Aug. 15 by the Ohio Electric Railway and representatives of the Amalgamated Association through which the men are granted an increase of practically 10 cents an hour in their wages. The new scale for interurban men will be 46, 52 and 60 cents an hour in place of the present scale, which provides wages of 41 to 50 cents an hour. Trainmen on the city lines in Newark and Zanesville will receive 44, 49 and 57 cents an hour in place of the present scale of 38 to 47 cents an hour. Freight brakemen will receive 44 cents an hour, an increase of 9 cents. The union had asked 75, 77 and 80 cents an hour for men employed on both the interurban and the city lines.

Programs of Meetings

Illuminating Engineering Society

The fourteenth annual convention of the Illuminating Engineering Society will be held at the Hotel Statler, Cleveland, Ohio, from Oct. 4 to Oct. 7. Among the various divisions of illuminating engineering papers to be discussed will be automobile lighting, design and characteristics; reflectors, shape and intensity of light; illumination problems, such as store lighting and theaters. Many other topics related to illumination will also be considered.

Iowa Electric Railway Association

As announced last week, the midyear meeting of the Iowa Electric Railway Association will be held at the Fontanelle Hotel, Omaha, Neb., Sept. 16 and 17. John Sutherland, master mechanic of the Tri-City Railway, Davenport, Iowa, is chairman of the program committee, and if Scotch ingenuity and vigor mean anything, it is that this meeting will be one that no operating man in Iowa or neighboring states can afford to miss. The ELECTRIC RAILWAY JOURNAL has been "let in" on some of the secret planning for this program, planning which does not appear in the program as outlined below, but which contemplates that some highly interesting features will be "sprung" on the members. This paper is authorized to extend a cordial invitation to all the master mechanics and other operating officials in the neighboring states to attend at Omaha.

The program as announced includes a transportation paper by Edgar G. Anderson, assistant general manager and traffic manager of the Clinton, Davenport & Muscatine Railway, Davenport, Iowa; a paper on storekeeping by Thomas L. Kennedy of the People's Power Company, Davenport, Iowa; one on modern maintenance practices by Charles M. Feist, master mechanic of the Sioux City (Iowa) Service Company, and one on overhead construction and maintenance, by K. J. Keith of the Des Moines City Railway. In addition there will be two reels of motion pictures pertaining to the electrical industry and another reel showing how a claim agent won a $20,000 suit. There will also be "certain" entertainment features.

The paper as noted above will occupy the attention of the convention on the first morning, Thursday, Sept. 16. The afternoon of the first day will be devoted to inspection trips over the property of the Omaha & Council Bluffs Street Railway. This inspection will be arranged in sections and directed by the several department heads of the local company. The morning of the second day will be devoted to a discussion of the papers presented Thursday morning and of the points observed during the inspection trips of the preceding afternoon. Nothing has been arranged for the afternoon of the second day. Delegates are urged to make hotel reservations early.

Financial and Corporate

Abandonment Approved

Court Sustains Decision of Public Service Commission with Respect to Reno Company's Plea

The Supreme Court of Nevada recently sustained the order of the Public Service Commission of that State permitting the Reno Traction Company to abandon its cross city lines. Among other things, the railway agreed with the city to remove the rails and overhead wires of the abandoned lines at an early date, to pay the cost of repairing all streets that are injured in tearing up the rails, to put the Sparks line in first class condition, and to establish a transfer system with any bus line that may be established in Reno.

The decision by the commission which has been sustained by the court was rendered Dec. 22, 1919. It followed hearings before the commission held on March 22, 1919; May 17, 1919; Sept. 24, 1919; Oct. 8, 1919, and Oct. 24, 1919. From the testimony introduced it was shown that the total earnings of the Reno city lines for the year 1918 were $9,714, while the operating expenses of the city lines alone were $17,834.

COMMISSION FAVORS ABANDONMENT

With taxes, interest on indebtedness, etc., of $3,489 added to the expenses, it became obvious that it was impracticable from the point of view of either the interest of the public or that of the company to continue operation of the city lines. Furthermore, the cost of putting the existing system of city lines into a safe and proper condition appeared to be absolutely prohibitive, even if the fares and patronage were increased sufficiently to pay the normal operating expenses. In consequence Commissioners Simmons and Scrugham decided to allow the petition of the company for the discontinuance of city lines effective on Jan. 15, 1920, as follows:

1. Commencing at the intersection of Second and Sierra Streets in said City of Reno, and running thence westerly on Second Street to the westerly limits of the City of Reno.
2. Commencing at the intersection of Fourth and Sierra Streets, running thence northerly on Sierra Street to Ninth Street; thence easterly on Ninth Street to Center Street (the present terminal of said line) at the main entrance gate of the State University grounds.
3. Commencing at the intersection of Second and Virginia Streets running thence southerly on Virginia Street to Moran Street, thence easterly on Moran Street to Wells Avenue; thence southerly on Wells Avenue to Cheney Street (the present terminal of said line).
4. Commencing at the intersection of South Virginia Street and California Avenue, and running thence westerly to Plumas Street; thence southerly on Plumas Street to Reno Avenue.

Chairman Shaughnessy dissented. He said:

> I am unable to agree with the majority opinion for the reason primarily that I am not wiling to authorize the company to discontinue operation of its Reno city lines, until it has been shown beyond a reasonable doubt that the public, after being fully informed, will not adequately support the road. The company undertakes to save itself in so far as it can by proposing that it be permitted to abandon the operation of its Reno city lines, but, generally speaking, I feel that a line having been built, equipped and put into operation between points where it is rendering an essential public service, should not be abandoned until after the people have been given an opportunity to make operation successful through the medium of increased rates and patronage if necessary, and the company has been required to rehabilitate and modernize its facilities where by so doing substantial economies in operation can be effected; and this is especially true if, by such co-operative action, an essential public service can, for the future, be maintained and improved.

Mr. Shaughnessy suggested cash fares of 10 cents with two tickets for 15 cents.

The line of railway operated by the company comprises approximately 7 miles of track, 3 miles of which may be credited to the Reno service and the balance to the Reno-Sparks interurban service.

The injunction proceedings brought to prevent the abandonment did not hold. In other words, as stated at the outset, the railway won out and the case was dismissed. It was reported on Aug. 20 that the tracks were then being torn up. The company will in the future operate only the interurban line which runs out to Sparks.

Receiver Hopeful of Better Things

In a recent hearing on the matter of foreclosure of the property of the New York (N. Y.) Railways before Federal Judge Mayer, to which reference has been made previously in the ELECTRIC RAILWAY JOURNAL, the court stated that in seeking a foreclosure of the property of the railway the security holders were well within their rights, but that there appeared to be no reason for instant action. It was disclosed that the receiver of the company and his counsel were hopeful that time would cure many of the company's financial ills. Special reference was made to the Lexington Avenue line, which, like all the long lines embraced within the system, is not meeting expenses. It was pointed out, however, that a marked improvement in the income of this line might reasonably be expected within a short time due to recent changes in the district.

There was much talk in court concerning proposed reorganization plans, and it was said that any decree authorizing a sale of the property under foreclosure must be accompanied with some plan indicating measures to follow a sale of the property so as to guarantee the continued operation of the car lines.

The question of foreclosure will come before the court again for settlement before Nov. 1.

Back to the Owners

Court Permits New Haven Railroad to Abrogate Leases of Certain Rhode Island Trolleys

The trustees appointed under the dissolution decree against the New York, New Haven & Hartford Railroad obtained from Federal Judge Mayer at New York on Aug. 28 authority to abrogate the leases of certain electric railway lines held by the Rhode Island Company and to return the lines to the owners on Sept. 7 next. The court was also asked to instruct the trustees concerning 96,885 shares of the company and 9,132 shares of the stock and bonds, valued at $600,000, of the Providence & Danielson Railway, which were transferred to the trustees by the New Haven & New England Navigation Companies, and which were ordered to be sold July 1, 1921.

JITNEYS DECREASE EARNINGS

The earnings of the Rhode Island Company, which operates the electric railways in Rhode Island, the trustees explained, decreased steadily during 1918 and 1919 because of the competition of jitneys and increases in wages and materials. A default was made by the company in the payment of its franchise taxes, and it was unable to meet some of its current obligations. Finally, the property was placed in the hands of receivers, who have reported that the receipts were less than the operating costs.

The trustees said that they have no money to operate the lines, or to pay the cost of their upkeep. They stated that the stock of the company, in their opinion, could not be sold now or in the future for any substantial amount and that it appeared to be certain that the company will never again be able to operate them. Therefore there is no reason to believe that the sale of the property in July next will bring any price much above that which could be obtained for the lines as scrap.

Until next July, the trustees explained, they will be left in possession of the properties of the Providence & Danielson Railway and the Sea View Railroad without funds to pay for their operation. It was pointed out that the securities in the possession of the trustees belong to the New Haven Company, and that this company should be required to assume the cost and responsibility of their disposition. The continuance of their control by the trustees, it was said, could be nothing but a hindrance and a detriment to all of the parties in interest.

WANTS TO RETURN LINES

The court was asked to give the trustees permission to return the stock of the lines to the New Haven Company. The situation of the Rhode Island Company, it was said, was less critical than that of the other companies in the State of Rhode Island because the receivers are operating the company's lines.

New Haven Merger Approved

Federal Judge Mayer at New York signed an order on Aug. 26 modifying the decree of dissolution against the New York, New Haven & Hartford Railroad, made Oct. 17, 1914, which permits the company, if the necessary consents can be obtained from the Federal and State authorities, to merge with the Harlem River & Port Chester Railroad and the Central New England Railway. The purpose of the merger is to enable the New Haven Company to vote the 400,000 shares of stock of the Connecticut Company, which controls the Connecticut trolley lines, to the end that the latter company may execute a mortgage of its property so that outstanding debentures of the Consolidated Railway, a subsidiary of the New Haven Company, to the amount of $10,884,000 may be secured.

The Connecticut Company, it was explained, owes the New Haven Company $4,071,038, of which $1,000,000 is upon debentures and the remainder on notes for advances made up to Dec. 31, 1919.

In its application to the court the New Haven Company said that on March 1 last it was indebted to the United States Government for substantially $66,000,000, including its short term indebtedness amounting to $43,000,000, which was spent for betterments and improvements. The company stated that it was arranging for a new loan from the Government of $13,500,000 with which to buy needed locomotives and to make necessary improvements. It said that it expected to be able to meet all of its financial obligations by taking advantage of the transportation act of Feb. 28 last until the return of normal conditions, when it hopes to be able to take care of its own financing.

The application says that the Consolidated Railroad was merged with the New Haven Company on Feb. 28, 1910. The New Haven Company assured the court that the merger of the New Haven with the Harlem River & Port Chester and Central New England Companies would conserve the interests of all the many companies that are involved.

Net Loss Increases

The net loss of the Pacific Electric Railway, Los Angeles, Cal., for the month of May was $147,671. This makes a total loss for the first five months of 1920 of $625,298. The interest on its funded debt alone is greater than the gross income for the period considered. Total railway operating revenues for May were $1,223,684 and the total railway operating expenses $898,112. The operating ratio was 73.3 per cent. Taxes were slightly more than $50,000. The company had a non-operating income of $2,000, which made the gross income $277,585. The interest on the funded debt amounted to $368,116, and taking the rents and depreciation reserve into account also, the total deduction from the gross income was $425,256.

The company handles a large freight traffic. In 1905, 886 carloads of freight were handled, while in 1919, 108,460 carloads were handled. The company has applied for increased rates and a hearing is now going on.

INCOME STATEMENT—PACIFIC ELECTRIC RAILWAY

MONTH—MAY, 1920

Passenger revenues	$ 873.052
Freight and switching revenues	298,073
Other revenues	52,559
Total railway operating revenue	$1,223,684
Way and structures	$ 99,943
Equipment	176,676
Power	148.636
Conducting transportation	370 248
Traffic	11.672
General and miscellaneous	92,597
Transportation for investment—credit	1,660
Total railway operating expenses	$ 898,112
Net operating revenue	$ 325,572
Taxes assignable to railway operations	50,007
Operating income	$ 275,565
Non-operating income	2,020
Gross income	$ 277,585
DEDUCTIONS FROM GROSS INCOME	
Interest on bonds and other debt	$ 368,116
Rents and miscellaneous income debentures	37,327
Depreciation	19,813
Total deductions from gross income	$ 425,256
Net income transferred to profit and loss	$ *147,671
Net loss for five months ended May 31, 1920	$ *625,298

*Deficit.

Effect of Fare Increases

An increase from a 5-cent to a 7-cent fare was made by the Chicago & Joliet Electric Railway in Joliet in August, 1918, and an increase from a 7-cent to a 10-cent fare was made effective in August, 1919. The four months remaining in 1919 showed a decrease in traffic of 1.4 per cent. The accompanying table shows statistics for the first six months of the years 1918, 1919 and 1920.

Jan. 1 to June 30	Fare (Cents)	Revenue Passengers Carried	Revenue From Passengers
1918	5	2,916,691	$146,961
1919	7	2,485,633	174,005
1920	10	2,574,901	248,442

The 7-cent-fare period compared with the 5-cent-fare period shows a decrease in traffic of 16 per cent and an increase of 18.4 per cent in revenue with an increase of 40 per cent in fare. The 10-cent-fare period compared with the 7-cent-fare period shows an increase of 3.6 per cent in traffic and an increase of 42.8 per cent in revenue with an increase in fare of 42.7 per cent. The 10-cent-fare period compared with the 5-cent-fare period shows that with an increase of 100 per cent in fare the traffic decreased 13 per cent, while the revenue increased 69.2 per cent. It has been estimated that if the fares had remained at 5 cents there would have been natural increase in traffic and revenue of at least 12 per cent. It is firmly believed that the 100 per cent increase in rate of fare has resulted in increasing the revenue at least 50 per cent.

Financial News Notes

Certificate of Dissolution Filed.—The Trenton (N. J.) Traction Company, an old holdings corporation which has not functioned for several years has been finally dissolved. A certificate of dissolution has been filed with Secretary of State Martin. The directors of the old company were John A. Rigg, Richmond L. Jones and Walter A. Rigg, Reading, Pa.; and F. W. Roebling, Jr., and Dr. Edwin H. Ginnelly, Trenton, N. J.

Vote to Reopen Lines.—The citizens of Randolph, Mass., have voted to appropriate $4,000 for the reopening of the Braintree-Randolph line of the Eastern Massachusetts Street Railway. Braintree has already appropriated $4,000 and the public trustees of the company have announced that they intend to restore service as soon as possible. Considerable rehabilitation work will be necessary to place the line in operation, since it has now been idle for several months.

Separate Receiver Likely.—Justice Alonzo Hinkley in Supreme Court at Buffalo will appoint a receiver for the Hamburg (N. Y.) Railway in a foreclosure suit brought by the Bank of Buffalo in behalf of the bondholders under a first mortgage for $750,000. The proceedings will come up early this month. The Hamburg Railway is part of the Buffalo & Lake Erie Traction Company's system which will be abandoned under a decision of the court. John F. Burke of Buffalo is suggested by the bondholders for receiver. Bondholders believe the line can be successfully operated if separated from the Buffalo & Lake Erie system.

Smaller Grand Rapids Deficit.—In spite of the fact that the Grand Rapids (Mich.) Railway raised its fare from 6 cents to 7 cents on June 24 the report of the company's operations for July showed a deficit. Although fewer passengers were carried in July, 1920, than in July, 1919, the losses were not as great, the deficit for July, 1919, having been $19,323, while the deficit for July last was $5,446. Passengers carried decreased 64,321. Total earnings of the company from all sources in July were $158,052, an increase of $37,869 over the earnings for the same month last year. The net income after deducting expenditures was $45,581, from which is to be deducted $51,027. Power cost the company $26,602 less in July, 1920, than it did in the same month of 1919. An appraisal of the property of the company is now being made under the auspices of engineers selected by the city.

Traffic and Transportation

Jitneys Must Go

Connecticut Company Holds Out for Reenactment of Old Bridgeport Ordinance Properly Drawn

The trustees of the Connecticut Company feel they cannot resume service in Bridgeport under an ordinance such as the committee appointed by the Mayor to consider transportation matters recommended, but are prepared to resume service under a measure along the lines indicated by the ordinance of July 12. This is the substance of a reply made by Arthur M. Marsh, attorney for the company, to the question put to him at an open meeting called by the Mayor and held in Bridgeport on Aug. 30. More than 600 people attended the meeting.

COUNCIL FAILS TO ACT

The Council took no action on the trolley-jitney controversy at the meeting on Aug. 30, but called another meeting for the latter part of the week, at which it was proposed to have jitney officials, members of the ordinance committee of the Commission Council, the Mayor's special commission and representatives of the railway confer in the hope that some middle-of-way procedure might be found toward a settlement of the matter.

Mr. Marsh represented the Connecticut Company in the absence of Mr. Storrs. He said that the company's attitude was not a question of fairness or of unfairness, but of what was best for the city of Bridgeport. He is quoted as follows:

> I think it is only fair to the Connecticut Company and only reasonable that arguments should be directed to the powers which the Aldermen have. The board is not responsible for things left undone which only the General Assembly can do. I think they are only responsible for what Judge Banks said they might do. We have been pretty well down financially as a public service corporation for some days. We say it is impossible as a business proposition to go on with the service unless the city desires to make some change in the situation. The Board of Aldermen has powers to establish routes as it may see fit within certain limitations. I do not suppose the Council can make routes for the jitneys. I suppose they must be somewhat reasonably adjusted in a way that none of us lawyers know at present. They cannot be entirely excluded, but if the city sees fit they certainly can be excluded from certain streets and make routes where they shall run, even from the standpoint of safety, if necessary.

COMPANY LEFT IN DARK

A letter was read from Mr. Storrs dated Aug. 30 noting his inability to be present at the meeting. Mr. Storrs said that the decision by Judge Banks on the jitney regulatory measure passed by the Council on July 12 pointed out definitely the form of an ordinance which would be valid, but he said that the company had not been advised that any steps had been taken to adopt an ordinance in pursuance of the court's ruling. The attitude of the company is summarized in the last paragraph of the letter of Mr. Storrs. It is as follows:

> I am directed to advise you the company is prepared, as it has been at all times, to resume service as soon as an ordinance corresponding substantially to the July 12 ordinance, but following Judge Banks' ruling, is enacted and made effective.

The directors of the Chamber of Commerce have written the Mayor and the Board of Aldermen that they indorse the report of the traffic commission as the best solution of the transportation problem that has been submitted, but that they believe, so far as it is possible, no jitney should be routed on the streets occupied by the trolleys except as it is necessary to cross the down-town district, or to connect one or two blocks from one non-trolley bearing street to another non-trolley bearing street. This report was summarized in the ELECTRIC RAILWAY JOURNAL for Aug. 28.

Eight-Cent Fare Allowed

The Public Service Commission for the Second District of New York has fixed the maximum fare to be charged in Johnstown, Gloversville and Amsterdam by the Florida, Johnstown & Gloversville Railroad at 8 cents.

On July 14 the company applied to the commission for permission to increase fares on three days' notice as follows:

> Gloversville—From 6 to 8 cents in Gloversville and outside territory where a 6-cent fare now applies.
>
> Johnstown—From 6 to 8 cents in Johnstown and outside territory where a 6-cent fare now applies.
>
> Between Gloversville and Johnstown—From 10 to 12 cents.
>
> Amsterdam—From 5 to 8 cents and from 6 to 8 cents in Amsterdam and outside territory where 5 and 6 cent fares now apply.
>
> Commutation fares—General increase of 15 per cent on all fifty-four-trip, twenty-four-trip commutation, and forty-six and 100 strip school tickets.
>
> Five strip tickets—From 35 to 40 cents.

The company has been operating under a 6-cent fare, except on certain parts of its system in Amsterdam where there is a 5-cent fare restriction in a franchise since Nov. 27, 1918, and under this operation, the company alleged, there has not been a yield in net revenue anticipated on the application for the 6-cent fare. Operating expenses, it was claimed, have been constantly growing since 1917 and 1918 with the result that for 1919 under a 6-cent fare the company's city lines have had a deficit of $42,746, without charges for depreciation. It also stated that there was pending a demand for an increase of 30 cents an hour to its electric division employees. The increased rate of fare, the company says, is necessary to meet wage increases.

Voters O. K. Fare Rise

Good-Will Policy Wins Sioux City Company Right to Charge 6 Cents—Improvements Planned

Sioux City, Iowa, went to the polls on Aug. 17. It went there to record its opinion of the Sioux City Service Company. This opinion, as expressed in its votes, was clear-cut and, from the standpoint of the railway management, gratifying. To the company it said, "You need more revenue; go ahead and raise the fare."

As a result of the action of the Sioux City voters a 6-cent fare will take effect on the company's lines on Sept. 7 or as soon thereafter as the necessary legal steps have been taken by the City Council. In return for the higher fare the company plans to improve the service. While few if any extensions can be made at this time, faster headway is to be maintained and equipment will be put in first-class shape. The carmen will also receive a raise in wages. The new fare will continue for three years.

Approval of the higher rate came as the reward of a policy of good-will on the part of the company management. Some time ago the city authorities, moved by the plight of the railway, took steps to obtain the voters' judgment on the question of an increased fare. The company opened its books to the public and asked for a thorough investigation of its statement that it could not raise the carmen's wages under the 5-cent rate. Business men of high standing in the community found the facts to be as the company represented them.

GOOD-WILL POLICY WINS

A majority of three to one was recorded in favor of the fare increase. While only a small proportion of the city's voting strength was polled, every precinct went on record as favoring the higher rate. There was little opposition on the part of laboring men. The attitude of the city at large is summed up in the following extract from an editorial from the Sioux City *Journal* of Aug. 18:

> The overwhelming majority of the votes cast by the people of Sioux City in favor of a just and reasonable increase proves that the public is willing to be fair with public service corporations which are fair with the people. The service company did not act arbitrarily. It opened its books to the public and asked that an investigation be made to verify its statement that it could not, under the 5-cent fare, grant the increase in wages asked by its employees. The investigators, composed of experienced business men in whose ability and integrity the people had implicit confidence, found the facts supported in every particular the contention of the company. The people accepted the findings of the investigators and granted the increase by a vote of more than two and a half to one. The public will do the same in any city and with any public service corporation which deals fairly and openly with it. That policy is better for the corporation than litigation, even when the courts decide in favor of them.

The contract with the carmen provides for 50 cents an hour for the first year, dating from May 1, 1920, to May 1, 1921; 52½ cents the second year, 55 cents the third year, 57½ the fourth year and 60 the fifth year.

Six Cents in Cleveland

New Rate Effective Probably Sept. 15—Company Wants Increase in Operating Allowances

At the meeting of the City Council of Cleveland, Ohio, Aug. 29, notice was received from John J. Stanley, president of the Cleveland Railway, that the interest fund would drop below the minimum of $300,000 the following day and that the rate of fare would automatically increase to the maximum provided in the franchise, 6 cents or nine tickets for 50 cents, with a charge of 1 cent for transfers. This will take place about Sept. 15, when the operating report for August is issued.

HIGHER OPERATING ALLOWANCE ASKED

At the same time Mr. Stanley asked for an increase of 4 cents per car mile in the operating allowance, increasing it to 32 cents, and to enable the company to create a reserve fund and take care of renewals, he asked for an increase of 2 cents per car mile in the maintenance allowance, which would make it 12 cents per car mile. He stated that the company has been operating at a deficit of 2 cents per car mile since the last increase was allowed. Mr. Stanley's letter follows:

> From March 1 to the end of August, the first half of the current ordinance year, our operating expenses have exceeded the allowance by 2 cents per car mile. The deficiency will be as great during the second half of the year unless the allowance is increased.
>
> To enable us to make good within the current year, that is by the end of February, 1921, this deficit of twelve months we ask that the operating expense allowance be increased 4 cents per car mile, or to 32 cents. This will make the average for the twelve months 30 cents per car mile.
>
> We ask also that the maintenance allowance be raised 2 cents per car mile so as to make the allowance from this time on 12 cents per car mile. This will enable us to begin to accumulate a reserve for depreciation. The franchise provides for such a reserve.
>
> The interest fund will be below $300,000 at the end of August—tomorrow—even on the present allowances, and the rate of fare must go to the maximum.
>
> The situation is a very serious one, the most serious that has confronted the stockholders of the company or the car riders of the city since the passage of the Tayler franchise in 1909. It calls for immediate relief. I beg earnestly that you act promptly and wisely upon this our petition.
>
> On June 1 we asked you to increase the maintenance allowance 2 cents and the operating allowance 8 cents. The commissioner recommended an increase of 1 cent for maintenance and 5 cents for operating expenses. That request of ours was based on estimates. So was the commissioner's recommendation. This request is based upon history.

FARE RISE AUTOMATIC

Should the interest fund drop below the minimum the company has the right to increase the rate of fare without action on the part of Council. It is difficult to say, however, what action will be taken on the request for an increase in the allowances.

Street Railway Commissioner Fielder Sanders said that it would be impossible to tell whether the fund will be below the minimum until the monthly statement is completed. He hopes that it will not be.

Some members of Council said that an attempt would be made to recover about $75,000, which was paid out as a dividend above the regular 6 per cent some time ago, as the courts have ruled that the ordinance granting an increase from 6 to 7 per cent had been defeated in a referendum vote. This, they believe, would increase the interest fund sufficiently to prevent an increase in the rate of fare at present.

Citizens Propose Louisville Solution

The "Round Table," a body of representatives of the civic and welfare clubs of Louisville, Ky., has come forward with a plan for the solution of the problems of the Louisville Railway. After several sessions the organization has made the following proposition:

> The Louisville Railway to surrender its present perpetual franchises and to be given twenty-year franchises in compliance with State laws.
>
> Fares for all city passengers to be raised to 7 cents for a period of two years, excepting for school children and teachers, whose fare during the school term will remain at 2½ cents.
>
> Creation of a street railway commission, composed of three members appointed by the Louisville Railway and three members appointed by the Board of Trade, all appointments subject to the approval of the City Council.
>
> Transfers to be unchanged unless changed by this commission.
>
> The commission to adjust fares every six months on Jan. 1 and July 1 at the expiration of the two-year period during which the 7-cent fare will be in force, the adjustments to be based on the "service-at-cost" plan.
>
> Majority vote of the commission to decide all matters that come before it, and in case of a tie the commission to select an umpire to decide, the umpire's fees to be paid half by the city and half by the company, and in case the commission is unable to agree on an umpire after thirty days, the Mayor to appoint one.

The "Round Table" proposes in its plan that the company shall pay the city $100,000 a year for street repairs. The Mayor has contended that this payment should be $168,000, or $1,000 a mile of track.

Rochester Fares Advanced

Seven cents is now the fare charged by the New York State Railways on its lines in Rochester, N. Y. The fare increase was made under the terms of the service-at-cost franchise recently granted the company. Charles R. Barnes, city street railway commissioner, ordered a 7-cent fare with four tickets for 26 cents to be put in effect on Aug. 28, in accordance with an order of the State Public Service Commission for the Second District.

The commission's order followed proceedings which went to the Court of Appeals in the Quinby case, wherein the commission was prohibited from permitting an increase in fare because of provisions restricting rates in Rochester to 5 cents. The city franchise was later modified, the city waiving the franchise restriction and permitting the commission to determine a reasonable rate of fare. Under the order issued by the commission, the company proposes to increase its service in Rochester by about 20 per cent and to make other improvements.

Five Cents Not Enough

San Francisco Municipal Lines May Charge 6 Cents to Meet Employees' Demands for More Pay

Another city-owned traction system is on the verge of a fare increase. Five cents is not enough for the Municipal Railway of San Francisco. Riders on Mayor Rolph's railway lines will consequently soon be paying a fare of at least 6 cents. This is the word which comes from the Board of Supervisors, to which is entrusted the task of financing the municipal system.

The Supervisors are sorely puzzled. What with the H. C. L. and the San Francisco dog days they were having enough to worry about anyway. Then the employees of the city lines came along and threw a sledge-hammer, not to mention a couple of wrenches, into the works. In short, the carmen asked for higher pay—much higher. Five dollars is not enough for a day's work, said they, so they asked for a daily wage of six dollars.

MONTHLY DEFICIT SHOWN

A six-dollar wage and a five-cent fare don't hitch, say the Supervisors. The finances of the city-owned lines are already sadly depleted. Payment of the present wages has been resulting in a deficit, which it has been necessary to meet from the depreciation fund. Each month the board by resolution has been appropriating more than $11,000 from this fund to care for this deficiency of revenue. The board cannot continue to draw upon the fund indefinitely, especially if the monthly deficit is to be increased by paying $1 a day more to each carman.

Of course the carmen are entitled to an increase of some sort, say the Supervisors. The men who work for the city must be taken care of, because, if for no other reason, each one of them can deliver at least one vote. But if the men are given more pay the fare must be raised. That would antagonize many thousands of car riders, who are also voters. So the Supervisors are in a dilemma.

Indications point to the granting of the men's demands. The Supervisors are only human. Since they must take a definite stand on wages they will probably satisfy the men now and take their chances with the car riders later. It may be hard to make a 6-cent fare popular, but that is easier, in the minds of many, than hurting the feelings of the faithful.

Six Cents in Des Moines

The strike of the employees of the Des Moines (Ia.) City Railway has been settled on the basis of an order made by Judge Wade of the Federal Court that a 6-cent fare shall be charged for a period not to exceed ninety days, the additional revenue to be applied to the 70-cent wage scale and the remainder to paying the back wages which result from the arbitration award dating back to March 1

Transportation News Notes

Six Cents in Sandusky.—Six-cent cash fares will become effective on the Sandusky, Ohio, lines of the Ohio Electric Railway, Springfield, Ohio, on Sept. 9. The increase from the present 5-cent rate has been approved by vote of the City Commission.

Bluecoats Carried Free.—Members of the New York City Police and Fire Departments, even when not in uniform, are now being carried free by the Interborough Rapid Transit Company. Frank Hedley, president of the I. R. T., recently issued an order which permits policemen and firemen to pass ticket choppers merely by displaying their badges.

Ohio Freight Rates Raised.—The Ohio Public Utilities Commission on Aug. 20 authorized all interurban railways operating in the state to increase freight rates 40 per cent, effective Sept. 1. Applications for 20 per cent increase in passenger rates are to be decided by the commission on the merits of each application. The commission recently refused to permit increase in intra-state rates for steam roads.

Bus Service to Stockyards.—In accordance with an agreement between the city of St. Boniface and the Winnipeg (Man.) Electric Railway, a motor bus service has been established to the stockyards near the former city. A seven-minute service is given between 6 and 9 a.m. and 4 and 6.30 p.m., and a fifteen-minute service from 9 a.m. to 4 p.m., and 4.30 to 12 p.m. Free transfers are given.

City Fights One-Man Cars.—The City Council of Berkeley, Cal., has put itself on record as opposed to the introduction of one-man safety cars on the local electric railway lines. The San Francisco-Oakland Terminal Railways, which operates in Berkeley, has announced that it will install a number of such cars on its city lines. At a recent meeting the Council adopted resolutions declaring that the installation of "safeties" would be considered "undesirable, impracticable, and unsafe."

Seven Cents in Belleville.—The East St. Louis & Suburban Railway, East St. Louis, Ill., has raised its fare on its line between East St. Louis and Belleville from 6 cents to 7 cents. The company is also charging a 7-cent fare on its Belleville city line. The increase was made necessary by the recent advance in wages granted the company's employees. The East St. Louis Railway was recently authorized by the State Public Utilities Commission to charge an 8-cent fare on its East St. Louis city lines. The fare was formerly 6 cents.

Denies Long Island Rise.—The Public Service Commission for the First District has denied the application of the Long Island Railroad, New York, N. Y., to put into effect the 20 per cent passenger rate increase promulgated by the Interstate Commerce Commission. The company filed an application with the commission subsequent to withdrawing a previous request for a 10 per cent increase. The company has announced that it will appeal to the Interstate Commerce Commission from the decision of the Public Service Commission.

Asks More Time on Car Order.—Because of manufacturing and transportation difficulties the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has found it impossible to comply with the order of the State Railroad Commission requiring it to install fifty new cars by Sept. 1. The company has asked the commission to extend the time limit within which the cars may be placed in service. The cars have all been contracted for and construction is progressing as rapidly as possible. John I. Beggs, president of the company, recently stated that the cars should begin arriving in Milwaukee about Nov. 1.

Three Cents a Mile Asked.—The Auburn & Syracuse Electric Railroad, Auburn, N. Y., operating between these two cities, proposes on Sept. 20 to increase its single trip ticket fares for interurban travel between the Auburn and Syracuse city lines, for distances over three miles, from 2.75 to 3 cents a mile. Other changes are: Fifty-trip commutation fares between interurban points increased from $4 to $5 for distance of five miles or less; from $13.75 to $14.25 for nineteen miles; from $13.75 to $15 for twenty miles; from $13.75 to $15.75 for twenty-one miles; and from $13.75 to $16.50 for twenty-two miles.

Commission Probes Fare Plea.—The Public Service Commission for the First District has begun an investigation, upon the application of the Manhattan & Queens Traction Corporation, New York, N. Y., for an increase in its rates of fare. The employees of the company went on strike recently demanding a material increase in wages. This increase the company was unable to meet, for the reason that it is in the hands of receivers and has been losing money over a period of several years. It seeks an increased fare between Manhattan and Jamaica to 8 cents, making the total fare for the two zones 13 cents, instead of 5 cents as at present.

Tickets Popular in Savannah.—Since fares were raised from 6 cents to 7 cents in Savannah, Ga., on July 15, the use of tickets by riders on the cars of the Savannah Electric Company has shown a marked increase. The ticket sales for July amounted to $16,654, and those for June to $4,571. Fifteen tickets are sold for $1. The company's revenue also shows a substantial gain, although the cash fares showed a decrease for the month of July as compared with June. The cash fare receipts for July totaled $77,314, while in June they amounted to $79,609. The net increase in revenue for July as compared with June was $9,788.

Ottumwa Increase Waits.—Although the Supreme Court of Iowa ruled recently in the Ottumwa Railway & Light Company case that it was possible for city councils to change public utility fares that company will not get an increased fare immediately. The company last week filed a petition with the Supreme Court for a *procedendo* to the District Court of Wapello County, in which Ottumwa is located, to give effect to the ruling of the Supreme Court. As the rules of the Supreme Court prevent the issuance of such an order before thirty days from the date the opinion is filed with the clerk of the Supreme Court it will be at least the middle of September before relief can be secured.

Slight Rise in Montreal Fares.—To meet the wage increase recently awarded its employees by a board of arbitration the Montreal (Que.) Tramways has been authorized by Montreal Tramways Commission to make a slight advance in its fare. The cash fare will continue to be 7 cents. Tickets will be sold at the rate of four for 25 cents, instead of five for 30 cents, either on the cars or at a company's ticket office, the increase being one-quarter of a cent on each ticket. Tickets by the book will be sold at the rate of fifty for $3 at ticket offices only, instead of at the rate of forty-four for $2.50. The latter price worked out at the rate of 5.7 cents a ticket, and the new rate at 6 cents even.

Another Rise in Cincinnati.—Fare increases are quite the order of the day in Cincinnati, Ohio. A short time ago Cincinnatians were told that the Cincinnati Traction Company must have more revenue and that under the terms of the cost-of-service franchise the fare would be raised to 7½ cents by ticket or 8 cents cash. Now the rate has again been increased, this time to a straight 8-cent basis. The new schedule of fares became effective on Sept. 1 and provides for the sale of five tickets for 40 cents. Children's tickets are sold at the rate of five for 20 cents. Free transfers are continued. Tickets good under the former schedules are not to be accepted for fare, but are redeemed at the company's office.

Injunction Sought on 10-Cent Fare.—The validity of a 10-cent fare recently granted the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, by the Findlay City Council, has been attacked in Common Pleas Court by George H. Phelps, a Findlay attorney, who has asked an injunction against collection of the fare, which is double the present rate. Council's action in granting a 10-cent fare was in violation of the 1915 twenty-five-year franchise granted the company, according to Mr. Phelps. That franchise fixed the 5-cent fare charge. The company was granted the 10-cent fare after it had filed application with the City Council for the discontinuance of local car service on the grounds that it was unprofitable.

Nine-Cent Fare in Davenport.—The Tri-City Railway & Light Company, Davenport, Ia., won a victory last week when the District Court of Scott County (Iowa) granted the railway the right to charge a 9-cent fare in Davenport. The temporary writ was issued by Judge House. According to the ruling of Judge House the company will have to give a receipt when each 9-cent fare is paid, and if upon the final hearing a lower rate is established the passengers will be entitled to a rebate, the amount to be the difference between the 9-cent fare and the fare which is finally ordered. The new rate became effective with the order and no date has been set for the final hearing. Up to the date of the order the Tri-City Railway & Light Company had been receiving a 7-cent fare in Davenport.

Asks 7 Cents in Plattsburg.—Application has been made to the Public Service Commission for the Second District by the Plattsburg (N. Y.) Traction Company for permission to raise its fare from 5 cents to 7 cents. The Plattsburg Common Council has waived a provision of the company's franchise limiting its fare to 5 cents. The closing of the Government reservation at Plattsburg caused a decline in the company's revenue for the first seven months of 1920, compared with a corresponding period in 1919, of $5,400. Operating expenses have increased $1,639 over the 1919 period, resulting in a deficit of $3,145 on July 31 last, as compared to a surplus of $3,531 on July 31, 1919. Wages of conductors and motormen were raised on June 15 from 25 cents to 30 cents an hour.

City Fights Fare Rise.—The city of Steubenville, Ohio, has entered formal protest with the Ohio Public Utilities Commission against the proposed new schedule of rates effective on the local lines of the Wheeling (W. Va.) Traction Company on Sept. 1. The city contends that the new rates sought by the company are excessive and that any increase in fares is a violation of the franchise and contract which the company accepted some years ago. The company is seeking to increase its fares between Steubenville, Mingo and Brilliant, the advance through the establishment of fare zones being approximately 100 per cent. The city some time ago offered a 7-cent cash fare and a 6-cent ticket fare. The company seeks an 8-cent cash fare and a 7-cent ticket fare, with two new fare zones added.

Interstate Line Asks Rise.—The Pennsylvania-New Jersey Railway, Trenton, N. J., has petitioned the Interstate Commerce Commission for permission to increase its passenger fares and freight rates. The new schedule provides for an increase of 1 cent in each zone, making the rate 8 cents instead of 7, as now exists. Application for the increased tariff affects the lines of the company running out of Trenton to all points in Bucks County, Pa. The routes that would carry new rates are those between Trenton and Morrisville; Trenton, Yardley and Newtown; Trenton and Bristol; Bristol and Doylestown, and Trenton and Lambertville. The new schedule of rates would become operative on Sept. 17. The New Jersey & Pennsylvania Traction Company, Trenton, has applied to the State Board of Public Utility Commissioners for a similar increase.

Thousands Walk as Buses Quit.—City-owned buses operating on Staten Island, New York City, were ordered to discontinue service on Aug. 26. This step compelled between 10,000 and 15,000 persons who live in the interior of the island to walk several miles to reach trolley lines. The buses have been operating since the shutdown of the Staten Island Midland Railway, early this year, because of failure to obtain permission for a higher fare. The city appropriated funds to purchase more buses, but this step was stopped by a suit of a holder of traction securities. The bus operation in some places paralleled the service of the Richmond Light & Railroad Company. Captain Kuhn, receiver of the latter company, obtained an injunction in June restraining the continuance of operation of buses on lines paralleling the electric lines.

Would Arbitrate Rate Dispute.—Arbitration of a dispute between the Meridian Light & Railway Company and the city of Meridian, Miss., over the rate of fare to be charged by the company, was proposed in a letter recently submitted by the railway management to the City Council. The company several months ago moved to raise the fare from 5 to 7 cents but was restrained from doing so by Federal Judge Holmes, who ruled that under the franchise provisions the company had no right to raise its rates. The proposition presented to the Council provides for the appointment of a board of arbitration composed of three citizens, one selected by the city, one by the company and the third by two others. This board would go into all details of the controversy and recommend a fair rate. It is proposed that all existing franchises be modified or voided to conform to the adjustment made.

"Safeties" on Racine Lines.—One-man safety cars are now carrying many of the citizens of Racine, Wis., to and from their daily work. Thirty of the cars have been ordered by the Milwaukee Electric Railway & Light Company for use on its Racine lines. The first batch was placed in service on Aug. 26. The introduction of "safeties" was preceded by a publicity campaign designed to educate the public to the advantages of this type of equipment. One of the cars was placed on exhibition on Aug. 25 in the center of the city and the public was invited to inspect it and have its special features explained by competent men placed in charge. This exhibit was supplemented by a series of newspaper advertisements in all the local papers and designed to further explain and emphasize the "safety" features of the car and its advantages. Racine is a city of approximately 50,000 population. The safety cars have apparently been received with marked approval by both the railway company's employees and the riding public.

Eight Cents Cash in Wilmington.—An 8-cent cash fare became effective on the lines of the Wilmington & Philadelphia Traction Company, Wilmington, Del., on Aug. 17. The increase was made under authority of an order issued by the Board of Public Utility Commissioners. The company was directed to sell four tickets for 30 cents. The fare was formerly 7 cents. The commission based its order upon a valuation of the company's property made by A. L. Drum & Company, Chicago, Ill. The board declared that the sum of $2,361,278 in the appraisal could not be allowed as it did not represent property utilized for railway service only, but was also used for lighting purposes. After this amount was deducted the total of $6,814,100 remained as the property value allowed. To this the commission added $170,000, 85 per cent of the amount spent for improvements and betterments, making a grand total of $6,984,100, upon which an 8 per cent return was allowed. The company was permitted to abandon the 5-cent fare about two years ago. At that time it was authorized to charge a 7-cent fare but contented itself with a charge of 6 cents. The rate was raised to 7 cents a year ago.

Asks More on "Traction Division."—The San Francisco-Oakland Terminal Railways, Oakland, Cal., has applied to the State Railroad Commission for an increase in fare on its "Traction Division." The company operates in Berkeley, Alameda, Oakland, Piedmont, Emeryville, Richmond and San Leandro. The present fare is 6 cents. It recently applied to the commission for an increase in fares on its "Key Division." The present application does not ask for a specified amount but requests the commission to establish a reasonable rate of fare based on the sum of $20,889,000, which is given by the company as the fair value of its property devoted to the public service in its "Traction Division." The company says that immediately following the rate readjustment in August, 1918, when the fare was raised to 6 cents, the company's gross operating revenue increased more rapidly than its actual operating expenses. This condition, the company says, was reversed beginning with the six months' period ended Dec. 31, 1919, when actual operating expenses increased at a much faster rate than the gross operating revenue. The company says that during the entire period the rate readjustment has been in effect, actual operating expenses, plus the cash set aside for depreciation and the state tax on the increased revenue, have exceeded the increase in operating revenues by $285,723.

Personal Mention

Toronto Transportation Commission Organizes

At the first meeting of the new Transportation Commission recently appointed by the City Council of Toronto, Ont., P. W. Ellis was unanimously chosen chairman. Mr. Ellis is also chairman of the Toronto Hydro-Electric Power Commission.

E. M. Ashworth, secretary and assistant general manager of the Hydro Commission, was temporarily appointed as secretary.

The other two members of the Transportation Commission in addition to Mr. Ellis are George Wright and Frederick Miller. The commission has been appointed in view of the city's intention to take over the Toronto Railway system upon the expiration of the present franchise in September, 1921.

A. C. Colby has resigned as mechanical engineer of the Connecticut Company, New Haven, Conn., to become superintendent of equipment of the Detroit (Mich.) Municipal Railway. Mr. Colby has been in railway equipment work since 1905, when he was with the Rhode Island Company. He has served as master mechanic of the Birmingham, Ensley & Bessemer Railway, Birmingham, Ala., the Berkshire Street Railway, Pittsfield, Mass., and the Bridgeport division of the Connecticut Company.

E. M. Haas, formerly Western editor of the ELECTRIC RAILWAY JOURNAL, has been appointed manager of the railroad department of the H. K. Ferguson Company, Cleveland, Ohio. Mr. Haas is well known in the electric railway industry. For eight years following his graduation from Purdue University in 1905, he was engaged in maintenance and construction work for the Illinois Traction System and the Chicago & Eastern Illinois Railway. He joined the staff of this paper in 1912, resigning three years ago to accept a position as manager of sales of the International Steel Tie Company.

H. M. Gould, who has been supervisor of overhead lines for the Connectcut Company, New Haven, Conn., has resigned from that position to accept the appointment as electrical engineer for the Street Railway Commission, Detroit, Mich. Mr. Gould is a graduate of the electrical engineering course of the Sheffield Scientific School, Yale University. He spent the two years following graduation in 1907 in the electrical department of the Long Island Railroad. The next year he spent as a student engineer with the Metropolitan Street Railway, New York City. He then spent some time in miscellaneous electrical work and in January, 1912, entered the city engineers department in Bridgeport, Conn. He left this position later that year to go with the Connecticut Company, with which he has been continuously since that time.

Engineer Now Operator

Martin Schreiber, Chief Engineer of the Public Service Railway, Made Division Manager

Friends of Martin Schreiber, chief engineer of the Public Service Railway of New Jersey, will be interested to learn of Mr. Schreiber's recent appointment as manager of the company's Southern Division. Mr. Schreiber's new work will take him for the first time from the engineering to the managerial field. He will remain in close touch with the engineering department of the railway through his retention of the title of chief engineer, although most of his time will be devoted to the operating end of the business. His headquarters will be in Camden, N. J., where, as announced in last week's issue, he succeeds William B. Graham, whose position as division superintendent has been abolished.

MARTIN SCHREIBER

Mr. Schreiber is known throughout the country for his work as an engineer. For many years he has been actively identified with the American Electric Railway Association and various technical societies. During 1912 he served as president of the American Electric Railway Engineering Association, and later as a member of the committee on electrolysis. He has been chief engineer of the Public Service Railway since 1917.

Mr. Schreiber was born in Ironton, Ohio. He obtained his early education in civil engineering through association with his father, who was a general contractor. Graduating from Ohio State University in 1899, with the degree of mechanical engineer, he served for four years with the Cleveland (Ohio) Electric Railway, first as an electrician, then as draftsman and chief draftsman, and later as engineer on powerhouse design and construction. In 1903 he went to the Public Service Corporation of New Jersey, continuing with that company and its subsidiary, the Public Service Railway, ever since.

F. J. Tew has accepted a position with the Sacramento Northern Railroad, Sacramento, Cal., as superintendent of shops and equipment. Mr. Tew recently returned to the United States after spending seven years in Manila, P. I., as master mechanic of the Manila Electric Railroad & Light Corporation. His headquarters will be at Chico, Cal.

George Buttrick has been promoted from assistant supervisor of lines of the Connecticut Company, New Haven, Conn., to be supervisor of overhead lines, succeeding H. M. Gould, who has resigned to go to Detroit, Mich. Mr. Buttrick has been with the company several years, having been superintendent of lines for the Bridgeport Division previous to 1917, when he was given the position from which he has just been promoted.

Michio Izawa, assistant traffic manager for the Japanese Government Railroad of Tokio, and Kujiro Hirayama, railway engineer of the Imperial Lines of the same city, are now in the United States studying modern railway methods. They are giving special attention to a study of the electrified lines now in operation in this country, as Japan's fuel supply can only last about fifty years more, and the mountainous districts have great possibilities for hydro-electric development. That Japan is seriously considering the possibility of electrifying its railroads is indicated by the fact that a bill has been introduced in the Japanese Parliament creating the Imperial Electric Railway. The aim of this measure is to establish electric power supplies for railroads and gradually to convert roads to electricity.

W. E. Blodgett, whose appointment as comptroller of the Winnipeg (Man.) Electric Railway was announced in last week's issue, is a native of Wisconsin. Mr. Blodgett gained his first accounting experience there and in Minnesota. He was accountant for the Twin City Rapid Transit Company, Minneapolis, prior to 1907, at which time he became associated with the Utah Light & Railway Company, Salt Lake City. He successively filled the positions of paymaster, statistician, chief clerk, assistant secretary and chief clerk to the general manager. After the consolidation in 1914 of the Salt Lake Light & Railway Company to form the present Utah Light & Traction Company, Mr. Blodgett became chief clerk to the general manager and to the secretary and treasurer. Four years ago he was elected secretary and treasurer of the company.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Demand for Track Supplies Exceeds Output

Long Deliveries Ruling and Prices of Bolts, Nuts and Spikes Have Advanced

Considerable scarcity is experienced in track supplies, such as bolts, nuts and spikes, and this, together with the increased freight rates, has resulted in prices being recently increased all along the line. One of the large producers who was quoting a base price of 6 to 7½ cents a pound on track bolts and nuts on Aug. 1 has increased the price of the smaller material, ⅝ in. and less, to 8 cents a pound. Bolts that are ¾ in. in diameter or larger still remain at 6 cents per pound, these prices referring to quantities of 200 kegs. On the same date this manufacturer was quoting railroad spikes at from 4 to 5¾ cents base, but on spikes ½ in. and smaller the price is now 6 cents a pound, and 4½ cents for larger sizes, with the usual extras added.

Demand does not seem to have suffered materially from the price increases, as it is extremely heavy and still in excess of the present output. Railroads are preparing their equipment for the winter, and though orders are large a still heavier buying movement is expected from the steam roads as a result of the recent rate increases. Electric railways are beginning to buy more heavily now, and demand from foreign countries for railroad spikes is also very large. Manufacturers are sold ahead on both large and small spikes. While inquiries are large, the present actual buying is relatively small compared to the call for bolts and nuts, though it is expected to expand. No deliveries on spikes of any size are promised under two to three months, it is reported. On bolts and nuts some producers are booked solidly for three or four months and cannot make shipment on small sizes under six months' time, though larger bolts, as ¾ x 6 in., can be shipped in from four to eight weeks. Producers see no immediate relief in sight as they are running to capacity now and are still several months behind on filling orders.

Stocks of finished goods are about non-existent both at the mills and in jobbers' hands. The situation would be more acute were it not for the slack building demand and the cancellations from certain quarters, as in the automobile industry, which have helped to ease the pressure on the supply of bars and rods.

Production has been greatly impeded by the car shortage, strikes and an inadequate supply of coal. Raw material has also been causing much concern as shipments of steel from the mills are very slow and manufacturers have been having difficulty in securing supplies of rods and bars. New orders are consequently not encouraged and it seems doubtful in some cases if books will be opened for general business during the fourth quarter, as the needs of old customers will probably take care of the available output during that period.

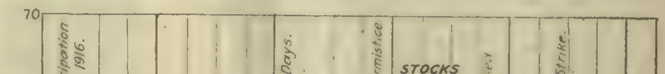
Reserve Coal Stocks Depleted

Consumer Is Held to Blame for Shortage—Relief Said to Depend on Railroads

Stocks of bituminous coal are below the safety level and consumers are aware of this, in the opinion of C. E. Lesher, editor of *Coal Age*, in an article published in the Aug. 26 issue. Production, though gaining, is at too low a rate to assure reaching a safe level of reserves before winter and there is at present an actual shortage of coal. The article states that the coal market will not fall to reasonable levels this winter unless stocks of bituminous coal mount to 40,000,000 tons by Dec. 1, which would be a gain of 18,000,000 tons over stocks on hand Aug. 1. Consumption is estimated at 41,000,000 tons per month and exports about 3,500,000 tons per month for July and August. In order to obtain the needed reserves, production must reach a figure of 46,000,000 net tons per month, which has been reached only during January and March this year. The Geological Survey has just completed a survey of all coal stocks, with the results indicated by accompanying illustration.

When the armistice was signed coal stocks had reached the unprecedented figure of 63,000,000 tons. After the armistice consumers refused to buy and instead depleted the reserve stocks, while workmen at the mines remained idle, until about 41,000,000 tons of reserve stock were consumed by June, 1919. The mine workers' strikes then occurred, so on Jan. 1 available reserves were reduced to about 17,000,000 tons. The switchmen's strike in the spring reduced coal distribution so that the present problem is to add to the 22,000,000 tons of reserve stocks until they have reached a figure of 40,000,000 tons within the next four months and at the same time care for the current consumption of coal. This is possible, in the opinion of Mr. Lesher, as it has been done in previous years, and whether it can be accomplished again depends largely on the ability of the railroads to move the coal to the consumers. Recent developments also indicate a reduction in production due to strikes brought about by the failure of the mine wage adjustment board to agree on a wage scale.

In summing up, Mr. Lesher thinks the consumer is to blame for the coal shortage and that it depends on the railroads as to whether the situation will be relieved. Apparently there needs to be a stabilizer in the coal industry whereby all-year capacity production of the mines may be obtained and fluctuation eliminated.



PRODUCTION, CONSUMPTION AND STOCKS OF BITUMINOUS COAL IN UNITED STATES FROM JAN. 1, 1916, TO AUG. 1, 1920

Asbestos Wire Outlook Better

Stocks of Wire Are Low and Deliveries Long, but the Conditions Are Improving

Long deliveries, nominal stocks and firm prices characterize the market for asbestos-insulated wire. Leading manufacturers are very busy trying to fill back orders and factory stocks are practically cleaned out. The supply of asbestos is reported ample, but the smaller sizes of copper wire are not obtainable in the desired quantities, chiefly as a result of recent prolonged strikes in the wire mills. Interruptions to copper wire production lasting about six weeks in one case and about twelve weeks in another cost the purchaser dear as well as the wire drawer. With increasing production in the wire mills following the return of steadier labor conditions the outlook is much improved for the smaller sizes of wire.

Deliveries quoted by representative manufacturers on magnet wire range from eight to twelve weeks. If producers did not take another order before 1921 there would be little trouble in keeping the plants running. One manufacturer who had about fifty-six weeks' work on hand last June 1 now has orders enough on his books to keep his employees busy until about July 1 of next year, barring cancellations. A few of these have been received, but no general disposition to retrench is evident.

MANUFACTURERS PUSHING PRODUCTION

Just now all makers of asbestos wire are not pushing sales at the normal rate, and more effort is being placed upon production and plans for the enlargement of manufacturing facilities than upon getting new business. This is of course not equally true of all competing houses, but until production begins to overtake demand, less "missionary work" will be seen in the trade. Users of asbestos-insulated wire for railway motor service would do well to order their anticipated winter requirements within the next few weeks, and it is generally held in manufacturing circles that the recent firm price levels will continue for some time to come. Labor conditions are showing some improvement, and since the recent advance in wages registered last spring no great difficulty has been encountered in obtaining enough employees for this class of material.

Representative factory prices of asbestos-insulated magnet wire start from 45 cents base on lots of 200 pounds or over, from No. 0000 to No. 4 B & S gage, inclusive, and extras are added per pound for the finer sizes ranging from 1 cent per pound on No. 5 to $3.85 per pound on No. 28. A 250-lb. order of No. 18 would be quoted in a typical case at 72 cents per pound. The dielectric thickness of the insulation in this material is equivalent to double cotton. Lots less than 200 lb. carry 2 cents per pound additional price, and a 1 per cent discount is given for payment within ten days. The outlook is good for increased facilities for production of asbestos wire during the next year or two, and with improved labor conditions and good supplies of asbestos and wire, record outputs may be expected from manufacturers.

Short Supply of Insulating Paper

Raw Materials Are Scarce, but Manufacturers Expect Conditions to Improve Soon

Makers of electrical products which require insulating paper in their manufacture are confronted with a marked scarcity of this paper, chiefly on account of the difficulty in securing raw material, though it seems that the situation will soon improve. The demand for insulating paper is especially heavy at present because of the large orders being placed for power and telephone cables and condensers. Power-cable manufacturers report that their orders have about doubled, but they are paying prices varying from 23 to 30 cents a pound for paper which cost them 19 to 22 cents last January.

SCARCITY OF SCRAP ROPE AND RAGS

Old manila rope and rags, the two bases from which the best paper is made, are very hard to obtain. The principal source of supply of scrap rope is the shipping industry, and as there has been a falling off in transportation by water due to strikes and other causes a shortage has resulted. Another factor which is active in diminishing the junking of rope is the high price of new rope, which is due to the great cost of raw hemp and the excessive demand from new ships being built. Rags are also scarce because the importation from foreign countries, which was formerly the chief source of supply, has been cut off. Quite lately, however, shipments from abroad have been resumed to some extent. As a substitute for these raw materials, wood pulp has been experimented with but has not yet been accepted by insulation manufacturers as a basis for the best papers. Moreover, wood pulp itself is difficult to obtain.

The very thin "glassine" all-linen paper, imported before the war chiefly for use in condensers, has been practically cut off from importation. American manufacturers have recently developed a paper said to be as good as the imported material, however, although it contains a large proportion of cotton. Another reason for the scarcity of insulating paper has been that the best grade of whiting, which is used in its manufacture, formerly came from England and the supply from that source was cut off until a month ago

Manufacturers express a hopeful view of the situation, however, because they seem to expect that the foregoing causes of shortage will soon disappear. Furthermore, European countries, including Norway, Sweden, Finland and Italy, are beginning to produce again.

Rail Bonds Increase in Price

Freight Rates Said to Cause Advance—Demand Is Light and Stocks Are Good

Representative manufacturers of rail bonds report a fair demand, but sales are lighter at present than for some time past. Orders are being received in somewhat spasmodic fashion and almost all of the buying is for maintenance purposes. A trend toward the use of arc weld bonds is also evident. Producers state that traction companies are making few extensions and are purchasing supplies only as absolutely needed, consequently the demand from that source is not a very heavy factor. Electrified railroads, on the other hand, are ordering more rails since the rate increase was granted them, and consequently more bonds are needed on their part. This increase in demand has only barely started, however, and is expected to become much heavier later on. Orders for rail bonds from abroad are also coming through in slightly better volume, and with the growing electrification of foreign roads a promising market is looked for in that quarter.

General price increases amounting to approximately 2½ per cent on the finished product were announced the latter part of August. This advance is said to be the direct result of the recent increased transportation cost, as otherwise manufacturing conditions have undergone little change. Production is reported about normal, and raw material is causing no difficulty other than the fact that embargoes and the shortage of cars have in many cases greatly delayed the arrival of material. The labor situation, too, is improved, compared with conditions in the past.

Stocks of rail bonds at the mills are reported in good supply by several manufacturers, and in some cases small orders are filled from stock. In general, however, deliveries require from ten days up to four weeks.

Sweden Favoring Electrification of Federal Railways

The Second Chamber of the Riksdag of Sweden has adopted the resolution previously acted upon favorably by the First Chamber, appropriating 23,000,000 crowns ($6,164,000) for the electrification of the railroad line Stockholm-Goteborg, the amount to be expended during the year 1921, according to Consul-General Dominic I. Murphy at Stockholm, Sweden.

The action of the Riksdag may be taken as a sure indication of the purpose of the Government to bring about the electrification of the entire system of the state railroad in Sweden. The bill now only awaits the royal approval, which will no doubt be given.

There ought to be good opportunity for American electric companies to present bids for the work, and it is suggested that they write to "Kungliga Järnvägsstyrelsen," Stockholm, Sweden.

Franchises

Ohio Electric Railway, Springfield, Ohio.—Application has been made by the Ohio Electric Railway for a renewal of its franchise along the Lincoln highway between the Columbus city line and the county line. Franklin County Commissioners say the company is seeking this renewal before undertaking improvements on its roadbed estimated at $75,000. The present franchise has four years to run.

Power Houses, Shops and Buildings

Municipal Street Railway, Seattle, Wash.—Contract has been let by the Board of Public Works to the United States Steel Company for furnishing three cables for the municipal street railway department. The company bid $14,584. The Yesler Way cable will be 22,500 ft. long, the Madison Street cable 14,150 ft., and the James Street cable 8,250 ft. The latter line will be $1\frac{3}{16}$ in. in diameter and the two others $1\frac{1}{4}$-in. steel rope. The three cables will weigh 114,399 lb.

Track and Roadway

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway has applied to the Los Angeles Railroad Commission for permission to construct a spur track on Santa Monica Boulevard and Orange Avenue.

Wisconsin Railway, Light & Power Company, Winona, Minn.—The La Crosse division of the Wisconsin Railway, Light & Power Company will complete its new line in Badger Street, La Crosse, by the middle of September.

Eastern Massachusetts Street Railway, Boston, Mass.—Plans for extending the Eastern Massachusetts Street Railway from Swansea to Swansea Center have been under discussion. Just what the status of the Seekonk-Swansea franchise was and how the Eastern Massachusetts Street Railway can present a petition for a franchise will be considered at a conference with the company's attorneys in Boston.

Phillipsburg (N. J.) Transit Company.—The Warren County Board of Freeholders has requested the Phillipsburg Transit Company to move its tracks from the side to the middle of South Main Street, where a new cement road will be laid.

New York State Railways, Syracuse, N. Y.—The Public Service Commission for the Second District has directed the New York State Railways to move as soon as practicable its track along Main Street in New York Mills between Campbell Avenue and the town line of New Hartford eastward wherever necessary in order to leave at all points at least 22 ft. available for paving Main Street west of the railroad track.

Syracuse & Suburban Railroad, Syracuse, N. Y.—Action is being taken by the trustees of Fayetteville, New York, to compel the Syracuse & Suburban Railroad to change the location and rebuild its tracks in Genesee Street in Fayetteville. The railroad through its attorney has explained that it cannot possibly finance the work at this time, but the attorney for the village claims that the railroad must comply with its franchise. Chairman Hill said that it seemed as if it would be necessary for the commission to order the work and to take steps for later proceedings in the event of a default.

Portland, Ore.—The Commission of Public Docks of Portland has awarded to Nelson & Brown, contractors, a contract for construction of the roadbed for municipal railway terminal No. 4, the work to be completed within forty days. The road will be one mile long, and the roadbed will cost $25,020.

New Advertising Literature

Indexes.—The General Electric Company, Schenectady, N. Y., has issued indexes to its descriptive bulletins and sheets and supply-parts bulletins, both dated July, 1920.

Insulating Fabrics and Link Insulators.—The General Electric Company, Schenectady, N. Y., has published bulletins Nos. 48715 and 49400, describing respectively the G-E insulating fabrics and the Hewlett link insulator.

Electric Drills.—The Independent Pneumatic Tool Company, 600 West Jackson Boulevard, Chicago, is distributing circular No. 33, describing its "Thor" universal electric drills, grinders, etc.

Fuel-Saving Devices.—Bulletin 111, issued by the Uehling Instrument Company, 71 Broadway, New York City, describes and illustrates the standard Uehling CO_2 meters, both single and multiple units.

Insulating Compounds.—"G-E Insulating Compounds" is the title of bulletin No. 48704A, published by the General Electric Company, Schenectady, N. Y., covering its insulating compounds, including insulating varnishes, japan oils, etc.

The Stromberg Electric Company, 200 West Jackson Boulevard, Chicago, manufacturers of time-recording systems, announces that it has opened an office at 803 Lexington Building, Baltimore, Md., with C. F. Ressiguie in charge.

Adjustable-Speed Motors.—The General Electric Company, Schenectady, N. Y., has issued a second edition of bulletin No. 41921A, superseding bulletin No. 41021 and describing the latest design of RF form A, direct-current, adjustable-speed motors, rated from 2 to 50 intermittent horsepower.

Trade Notes

The Safety Car Heating & Lighting Company has awarded contract for alterations in the former plant of the Marlin-Rockwell Company, New Haven, Conn., recently taken over by the company.

The Crane Company, 836 South Michigan Avenue, Chicago, recently celebrated the sixty-fifth anniversary of the founding of the company by R. T. Crane in 1855. Today the company has a total working space of 13,856,042 sq. ft. devoted to manufacturing and its employees number 15,304.

The Greenfield Tap & Die Corporation, Greenfield, Mass., has completed plans for enlarging its forge shop at Turners Falls, consisting of two new buildings, on which work will be started at once. The proposed new five-story plant of the company at Greenfield is held up for the time being.

The M. B. Austin Company, 700 West Jackson Boulevard, Chicago, manufacturer of electrical supplies, has acquired a site at 108-116 South Des Plaines Street, 91 ft. x 118 ft., on which it proposes to erect a two-story plant, to cost about $100,000.

The National Carbon Company, Cleveland, Ohio, has recently issued its No. 35 carbon-brush catalog, which supersedes catalog No. 34. Some grades of carbon brushes previously listed have been eliminated and others added. The number of types of shunts used has been reduced.

The Chase-Shawmut Company, Newburyport, Mass., has taken over the Chase-Shawmut Department of the Condit Electrical Manufacturing Company, with Sears B. Condit, Jr., president and treasurer, and Frank D. Masterson, vice-president and general manager. Mr. Masterson has been associated with the Shawmut fuse business for twenty-one years.

The Uehling Instrument Company, 71 Broadway, New York City, manufacturer of fuel economy equipment, announces that it is now represented in New England States by the Smith Engineering & Supply Company, 89 State Street, Boston, Mass., manufacturers' agents and engineers, specializing in power-plant equipment. S. W. Smith, president of the latter company, was until recently associated with the Uehling Instrument Company, with headquarters in the New York office.

The Ackley Brake & Supply Corporation, 50 Church Street, New York City, announces the appointment of E. A. Thornwell, Atlanta Trust Building, Atlanta, Ga., as general Southeastern agent for the sale of the Ackley brakes and G. & B. paint in the states of Georgia, Florida, Alabama, Mississippi, Louisiana and Tennessee. Mr. Thornwell was formerly manager of the railway division of the Westinghouse Electric & Manufacturing Company.

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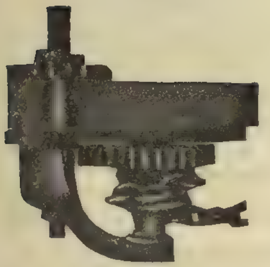

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50 Church St. NEW YORK
DETECTIVES
Street Railway Inspection
131 State St. BOSTON

ELECTRICAL TESTING LABORATORIES
Electrical, Photometrical and Mechanical Testing
80th Street and East End Ave., New York, N. Y.

THE COAL & IRON NATIONAL BANK
of the City of New York

Capital $1,500,000
Surplus $1,000,000 Und. Profits $363,051
Resources $23,743,000

Offers to dealers every facility of a New York Clearing House Bank.

Steam and Electric Railway "Checking"
Complicated Interurban and Ohmer Fare Register work a specialty. Confidential Investigations. Write for our proposition, "Prosecuting Dishonest Conductors." We maintain a special department thoroughly equipped for handling all strikes.
The Industrial Protective Company
Suite 804-5-6 Mutual Home Bldg., Dayton, Ohio

Scofield Engineering Co.
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REG. U.S. PAT. OFF.

TEXACO LUBRICANTS

for railway shop, power plant and rolling stock

Texaco Lubrication Engineers will gladly assist you in selecting the right Texaco Lubricants for your shop—power-plant, rolling stock, or any other equipment.

You may call upon them to make a survey of the equipment if necessary. This is Texaco Service—there is no charge.

THE TEXAS COMPANY

Dept. RJ, 17 Battery Place, New York City
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Power

RUGGEDNESS, endurance and remarkable digging power are reasons for the enviable reputation of Thew Shovels. Ability to stand up under the most strenuous kind of work assures Thew owners of real shovel worth.

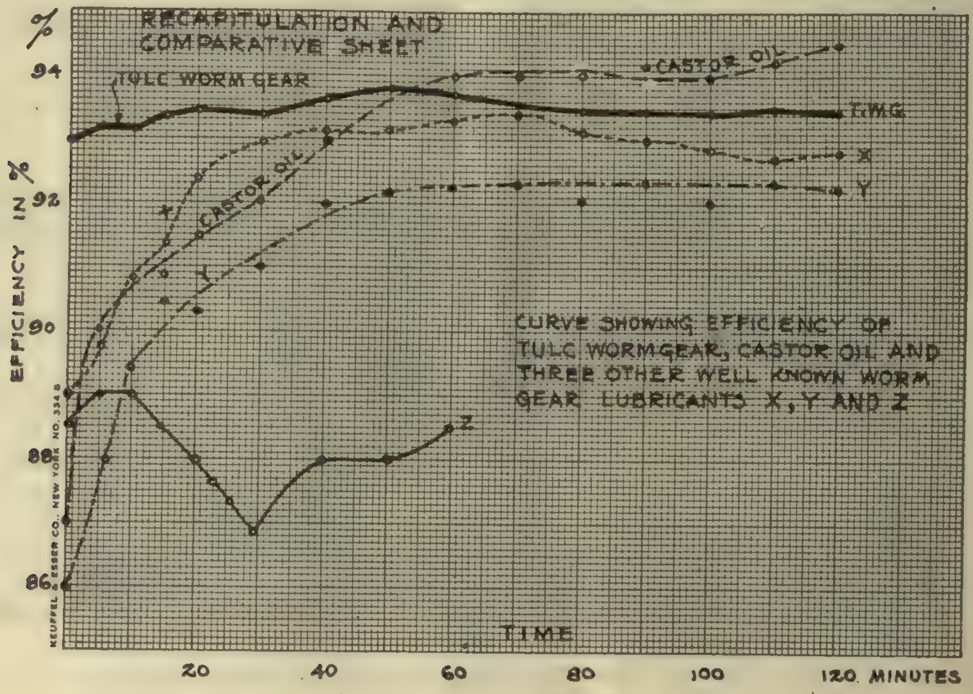
Thew Shovels built 22 years ago are still rendering efficient service. Uninterrupted success through all these years is the evidence that Thew Shovels are well built.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

Thew
Power Shovels

—how individual lubricating service reduces lubricating costs------------------------------

This Chart Tells the Story



The above is a recapitulation of five separate runs,

Data:

Room temperature 90 degrees F.
Time of run in each case, 2 hours.
Readings taken every 10 minutes.
Machine used had Hindley Worm Drive size and speed and conditions to compare to actual commercial use.

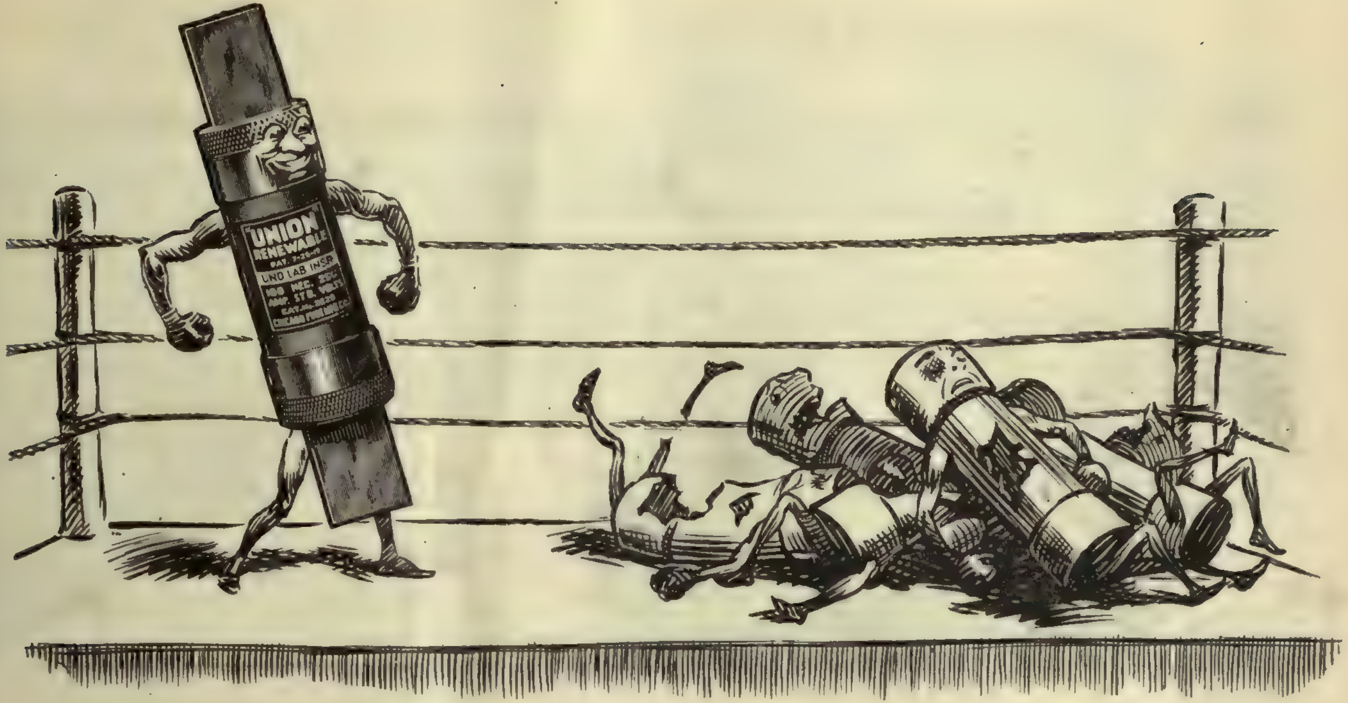
Write for Booklet "Results"

THE UNIVERSAL LUBRICATING CO.

Cleveland, Ohio

Factory: Sweeney Ave. Office: Schofield Bldg.

TULC+Universal Service



You Can't Knock Out a "Union" With Many Blows

"Union" Renewable Fuses will withstand more blowouts than any other fuse we know of. We wouldn't dare tell you how many times some "Unions" have been blown without being put out of business—because you wouldn't believe it.

So here's what we will do. Go to your electrical dealer and get a "Union" and any other three makes of fuses you think best. Put them all to the same test—the hardest you know of.

"UNION" Renewable Fuses

must withstand more blowouts than the others. If they don't, simply ship all the fuses to us and we'll send you our check for their cost.

We feel perfectly safe in making this offer. We know that you'll use "Union" Fuses exclusively if we can but get you to compare them point for point with other makes.

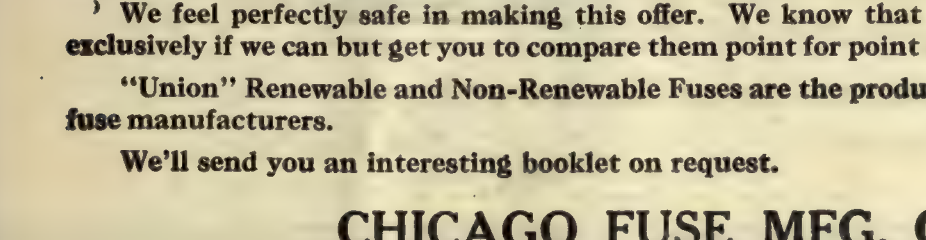
"Union" Renewable and Non-Renewable Fuses are the product of the oldest and largest fuse manufacturers.

We'll send you an interesting booklet on request.

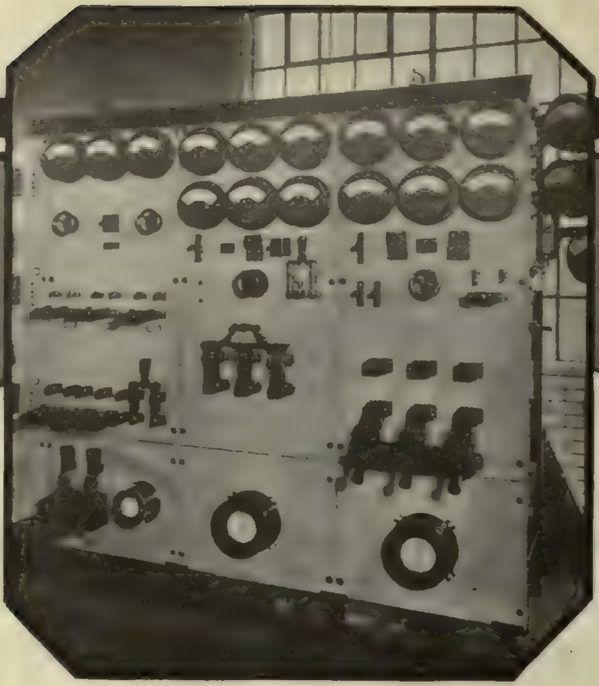
CHICAGO FUSE MFG. CO.

Oldest and largest manufacturers of Fuses, Electrical Protecting Materials and Conduit Fittings

CHICAGO **NEW YORK**



UNION
REG. U.S. PAT. OFF.



Friction and Insulating Tapes

The United States Rubber Company manufactures brands of friction and insulating tape to meet every condition encountered in the electrical field. Among them you will find the right tape for every purpose. All are scientifically compounded so that they have permanent dielectric and mechanical strength.

United States Rubber Company

1790 Broadway New York City

The World's Largest and Most Experienced Manufacturer of Mechanical Rubber Goods

BELTING

Transmission *"Rainbow," "Pilot" "Shawmut"—"Giant Stitched"*

Conveyor *"United States," "Grainster"*

Elevator *"Matchless" "Granite," "Grainster"*

Tractor *"Sawyer Canvas" "Little Giant Canvas"*

Agricultural *"Rainbow," "Bengal" "Grainster," "Sawyer Canvas"*

HOSE

Air *"4810," "Dexter"*

Water *"Rainbow," "Mogul," "Perfected"*

Steam *"Rainbow," "Giant," "Perfected"*

Suction *"Amazon," "Giant"*

Garden *"Rainbow," "Mogul," "Lakeside"*

Also Hose for Acetylene, Oxygen, Acid, Air Brake, Gasoline, Oil, Hydraulic, Air Drill, Auto Radiator, Car Heating, Chemical, Coke, Creamery, Discharge, Vacuum, Sand Blast, Spray, etc

THROUGHOUT the entire length of a roll of United States Tape you will find the same high quality. The fabric used is uniform in weave throughout and uniformly impregnated. All are adhesive and easy to handle.

Specify United States Tapes on your next order.

United States Rubber Company

1790 Broadway New York City

The World's Largest and Most Experienced Manufacturer of Mechanical Rubber Goods

PACKINGS

Rod *"Wizard," "Rainbesto," "Peerless," "Honest John," "No. 573" and hundreds of other styles in coils, rings, gaskets and diaphragms —*

Sheet *"Rainbow," "Vanda," "Paramo"* **Usco Valves —**

THE RIGHT PACKING IN THE RIGHT PLACE

MISCELLANEOUS

Mats, Matting and Flooring, Plumbers' Specialties, Rubber Covered Rolls, Moulded Goods

Dredging Sleeves, Hard Rubber Goods, Printers' Blankets, Tubing, Soles, Heels, Jar Rubbers, Friction Tape, Splicing Comp'd.

An Interurban Type

The Ohmer System

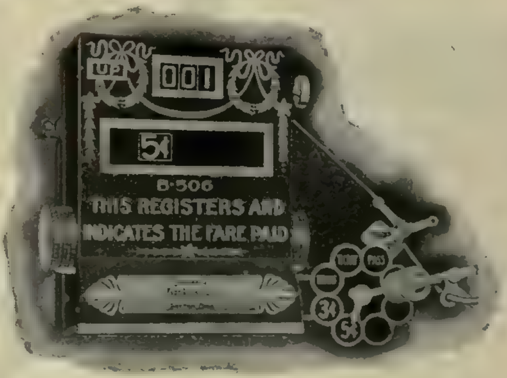
Interurban electric railway companies have made Ohmer fare registers a standard because many different fare denominations are accurately recorded, indicated and thoroughly protected.

City railway managers now realize that they also have a considerable variety of fare rates to be protected, and many Ohmer fare registers of types suitable for city service are being adopted. Cash fares in odd amounts, metal or paper tickets, school tickets, transfers, employes' passes, special passes, etc., are differentiated, indicated and properly recorded when Ohmer fare registers are used.

Operating equipments are made in every conceivable type for making Ohmer fare registers operative and absolutely satisfactory in every kind of car, and under any possible condition of service.

Don't experiment. Don't tie up your money unnecessarily. We finance the installation of Ohmer fare registers, and charge a modest rental as you receive the service. You will be in no danger of ever having a lot of obsolete devices on hand. Our contracts are flexible, and we are always ready to take care of changing conditions for you.

Ohmer
Fare Register
Company
Dayton, Ohio



A City Type

The Most Important Thing in the World

Is a drink of water when you need it.

A man suffered a stroke and died on a train when the doctor said a drink of water might have saved him.

In certain emergencies nothing is so all-important as clean water—unless it be the means to drink it.

DIXIE Cup

Penny Vending Machines for Passenger Cars and Stations

promote the comfort of your patrons—help to safeguard their health, and make their journeys more enjoyable.

This service is popular everywhere; standardized by one hundred and fifty railroads, as well as by stores, theatres, hotels and other public resorts. It is self-supporting—*not an expense* to you.

It will solve your drinking cup problem and at the same time yield you a revenue.

Write us today for sample cups and terms.

INDIVIDVAL DRINKING CVP COMPANY INC.

Original Makers of the Paper Cup
HUGH MOORE, President
220-230 W. 19th St., N. Y.

International Fare Registers

The Test of Time

Type R-5—Double Register

Type R-10—Single Register

INTERNATIONAL Fare Registers have for nearly a quarter of a century stood the test of service. They have been and are today the standard equipment of the leading Electric Railways and city systems of this country.

Their accurate and reliable registration and rugged construction is responsible for their excellent service reputation.

International Fare Registers through the test of long service have shown themselves to be not only accurate and reliable in their registration but so rugged in construction as to give enduring service. All parts are interchangeable, repairs few and easily made.

You Will Find Us in Space 608, Adjoining the Accountants' Room at the October Convention at Atlantic City.

Our organization is at your service to help with your problems.

The International Register Company

Manufacturers of Fare Registers and Railway Supplies, and General Selling Agents for
HEEREN ENAMEL BADGES
Office and Factory: 15 So. Throop Street, Chicago, Illinois

The "Once-a-Year" Opportunity

To get your sales message before electric railway buyers when interest in equipment, supplies and services is at its peak.

On October 2nd the Annual Convention Number of *Electric Railway Journal* will be issued.

On October 11th to 15th the Annual Convention and Exhibit of the American Electric Railway Association will be held at Atlantic City.

On October 16th the Annual Convention Report Number of *Electric Railway Journal* will be issued.

The *Electric Railway Journal* reaches from ninety-eight to ninety-nine per cent of the buying power of the industry. The guaranteed circulation of the Convention Number will be eight thousand copies.

The Report Number will be in the mail twenty-four hours after the last session. It will contain abstracts of all papers presented and report the discussions concerning them.

To cash in on this opportunity you should make every effort to keep complete information about your products before the eyes of the industry. Strong representation in the advertising pages of the Convention and Report Numbers is most essential.

Electric Railway Journal

Member Audit Bureau of Circulations
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Tenth Avenue at 36th Street
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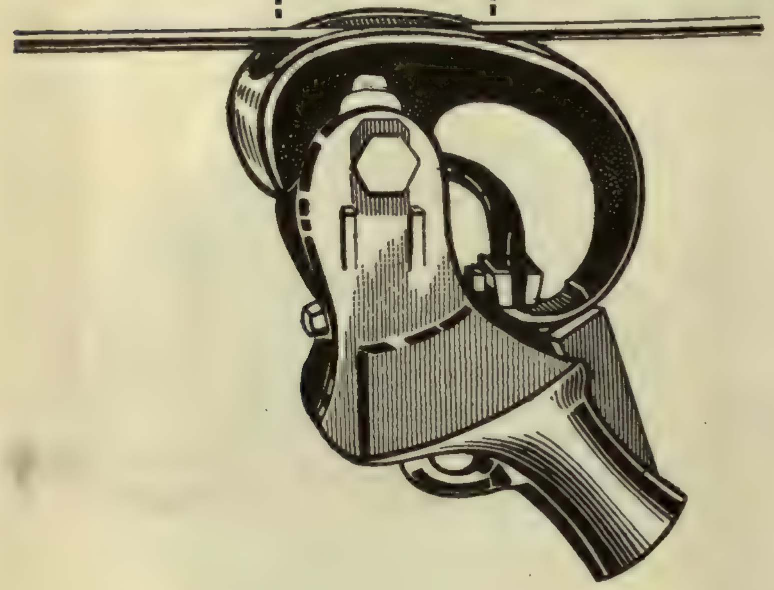

In all current collecting devices the more contact you have the less friction exists owing to the tension being distributed over a greater surface.

Miller Trolley Shoe operation proves that the greater the contact surface more power is delivered to the motors, giving greater capacity for overloads.

THE MILLER TROLLEY SHOE

has a contact on the wire of 3 inches. This contact is permanent. The Shoe follows each little uneveness in the wire. It does not jump and eliminates all sparking.

Miller Trolley Shoes have solved many problems that were the outcome of low voltage.

We stand ready at all times to show you on your own lines just what an advantage can be obtained by equipping your cars with the Miller Trolley Shoe.

Write Today for Details

Miller Trolley Shoe Co., West Newton, Mass.

SPECIAL REPRESENTATIVE: Holden & White, Inc., Chicago

EASTERN REPRESENTATIVE: National Railway Appliance Co., New York

SALES REPRESENTATIVES:

Alfred Connor
Denver, Colo.

S. I Wailes
Los Angeles, Calif.

T. C. White & Co.
St. Louis, Mo.

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San Francisco, Calif.

W. F. McKenney
Portland, Oregon

W. M. McClintock
St. Paul, Minn.

MONROE

Reg. U. S. Pat. Off.

Calculating Machine

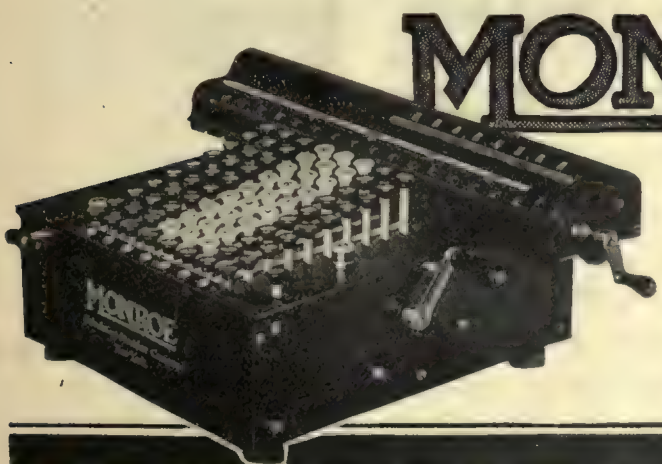
"Letting the Monroe Calculating Machine Prove Its Own Case"

"THIS machine will take care of all the figuring of every department in your organization, for the Monroe not only Adds, but Multiplies, Divides and Subtracts as easily as other machines Add.

"The operation of the Monroe is so simple and direct that anyone can work out complicated calculations after a few minutes' practice. For instance, just depress the keys. Then turn the crank—Forward to Add or Multiply, backward to Subtract or Divide. Nothing could be easier or simpler.

"And here's another big advantage—the Monroe Visible Check. The figures are always in sight of the operator who is able, at all times, to verify every calculation at a glance. Because of these the Monroe is daily proving in thousands of offices that it has no superior in speed and *absolute* accuracy on all kinds of figuring.

"Better than anything we may say for the Monroe is an actual try-out of the machine on your work in your own offices by your own help. You can then be the judge as to whether the time, money, and errors the Monroe will save you will justify its installation. No obligation whatever."



MONROE

Reg. U. S. Pat. Off.

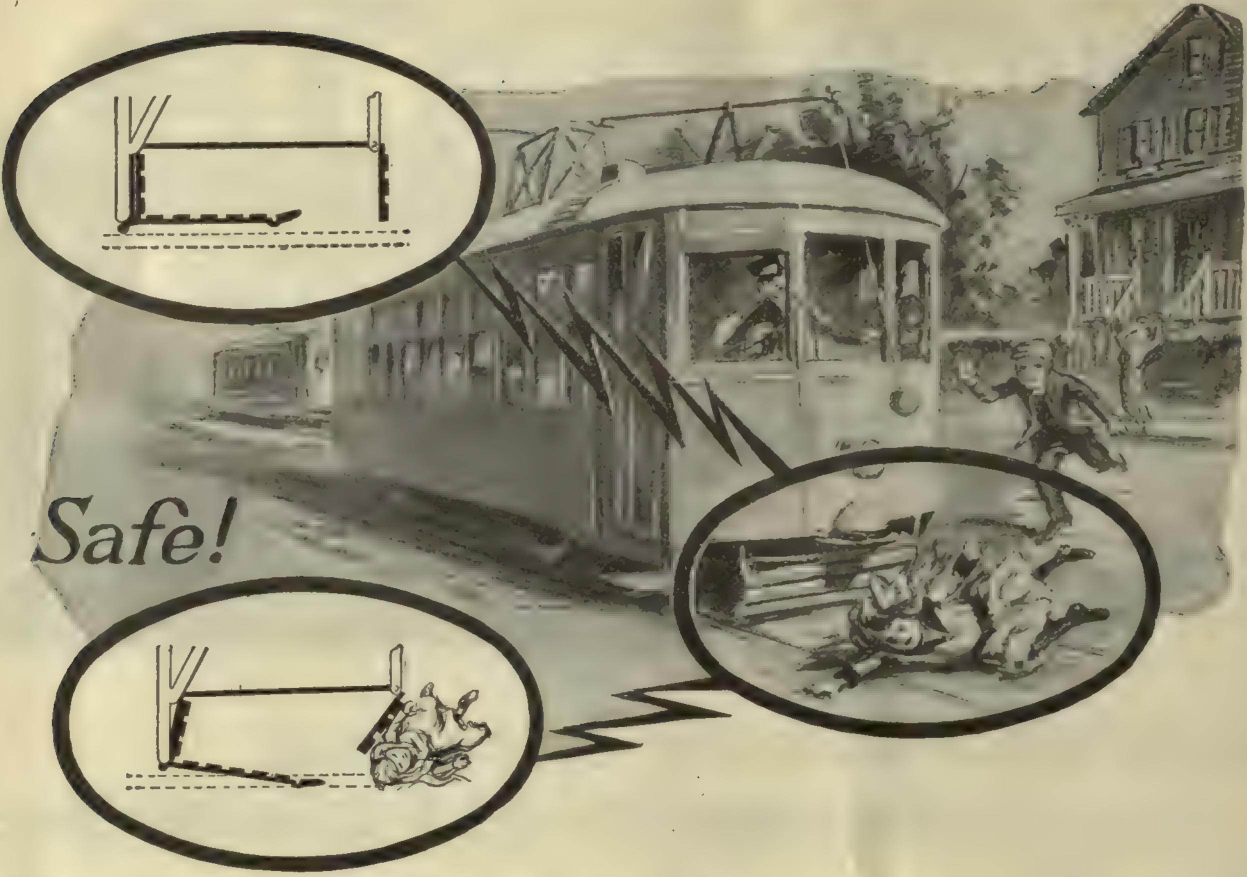
Calculating Machine

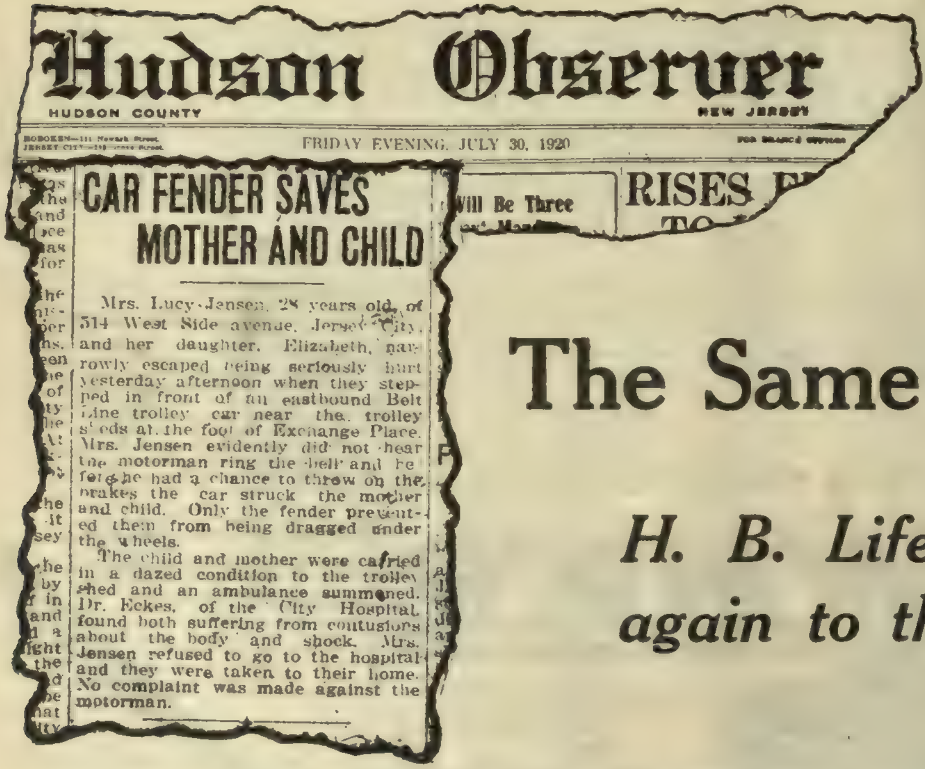
Not only Adds, but Multiplies, Divides and Subtracts as easily as other machines Add

Monroe Calculating Machine Company
Woolworth Building
New York, N. Y.
Offices in Principal Cities

The "SHOW ME" Coupon-Mail it today

To Monroe Calculating Machine Company,
Woolworth Building, New York, N. Y.
Without obligating us. (Check item desired.)
☐ Send us a copy of your folder "Q. E. D. and the Monroe."
☐ Give us a demonstration in our own office.
Firm Name..........................
Your Name..........................
Address..........................
E.R.J. 9-4-20





Hudson Observer

HUDSON COUNTY NEW JERSEY

FRIDAY EVENING, JULY 30, 1920

Will Be Three

RISES

CAR FENDER SAVES MOTHER AND CHILD

Mrs. Lucy Jensen, 28 years old, of 514 West Side avenue, Jersey City, and her daughter, Elizabeth, narrowly escaped being seriously hurt yesterday afternoon when they stepped in front of an eastbound Belt Line trolley car near the trolley sheds at the foot of Exchange Place. Mrs. Jensen evidently did not hear the motorman ring the bell and before he had a chance to throw on the brakes the car struck the mother and child. Only the fender prevented them from being dragged under the wheels.

The child and mother were carried in a dazed condition to the trolley shed and an ambulance summoned. Dr. Eckes, of the City Hospital, found both suffering from contusions about the body and shock. Mrs. Jensen refused to go to the hospital and they were taken to their home. No complaint was made against the motorman.

The Same Old Story

H. B. Life Guards again to the rescue.

The Consolidated Car Fender Co.

Providence, R. I.

General Sales Agent

Wendell & MacDuffie Co.

61 Broadway, N. Y.

Badmash

According to Hindu belief the wife of one king was carried off by another demon king and was so guarded that humans couldn't rescue her.

Hanuman, a monkey, got on the job, rescued the fair queen and was immortalized as a badmash, or hero.

Monkey antics won out this time, but it was only in mythology. In real life—especially as applied to carbon brushes—monkeying with things invariably gums the cards.

But engineering, as employed in prescribing Morganite brushes, relieves operators from monkeying with brushes or commutators—and the resulting gloss on the commutator is far removed from a monkey shine.

Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th St., New York

DISTRICT AGENTS:

Lewis & Roth, 13th and Wood Sts., Philadelphia

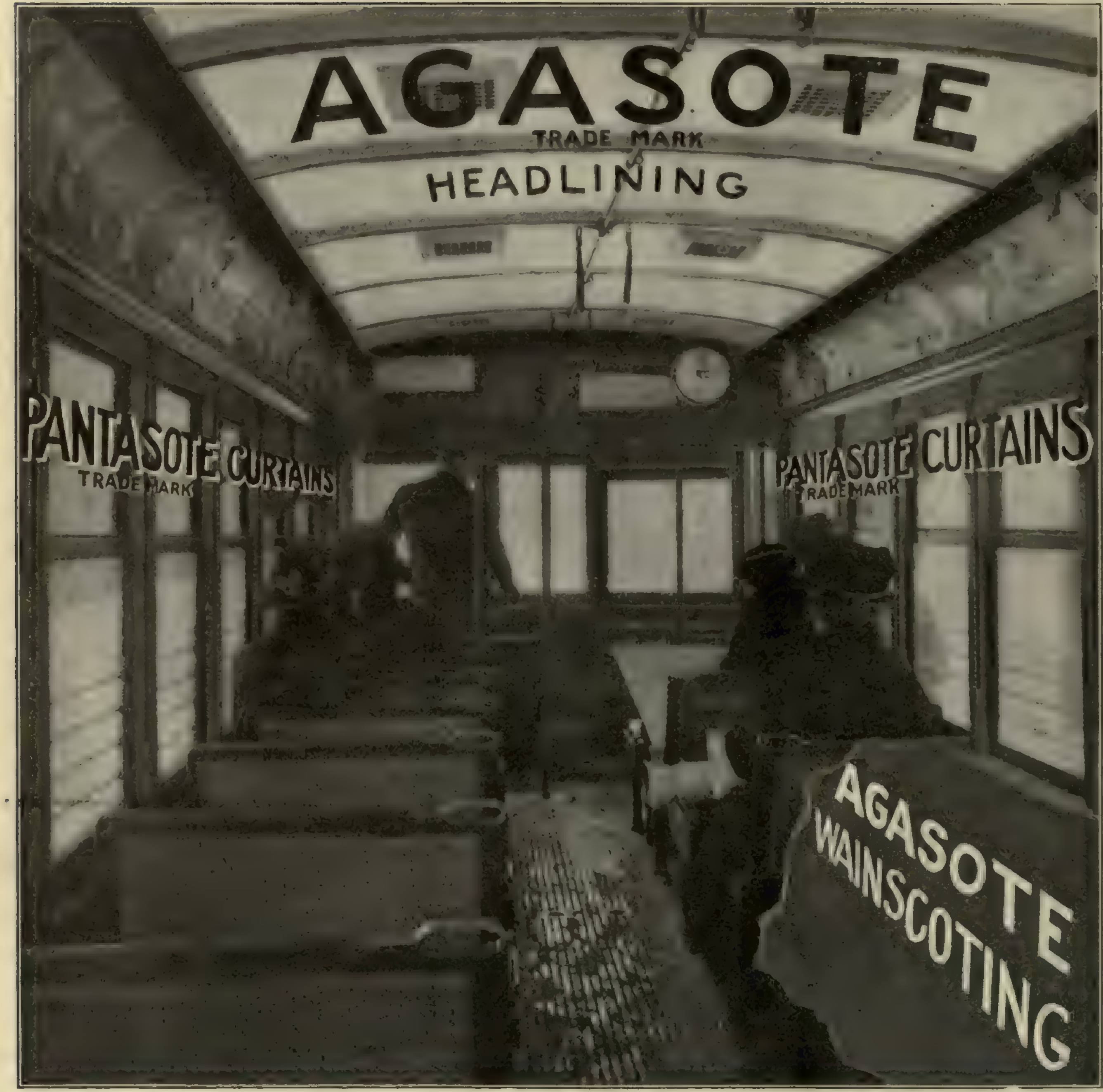
Electrical Engineering & Mfg. Co.,
First National Bank Bldg., Pittsburgh

W. R. Hendrey Co., Hodge Bldg., Seattle

Herzog Electric & Engineering Co., 150 Steuart St.,
San Francisco

Charles Farnham, I. W Hellman Bldg., Los Angeles

Railway & Power Engineering Corporation, Ltd.,
131 Eastern Ave., Toronto, Ontario, Canada

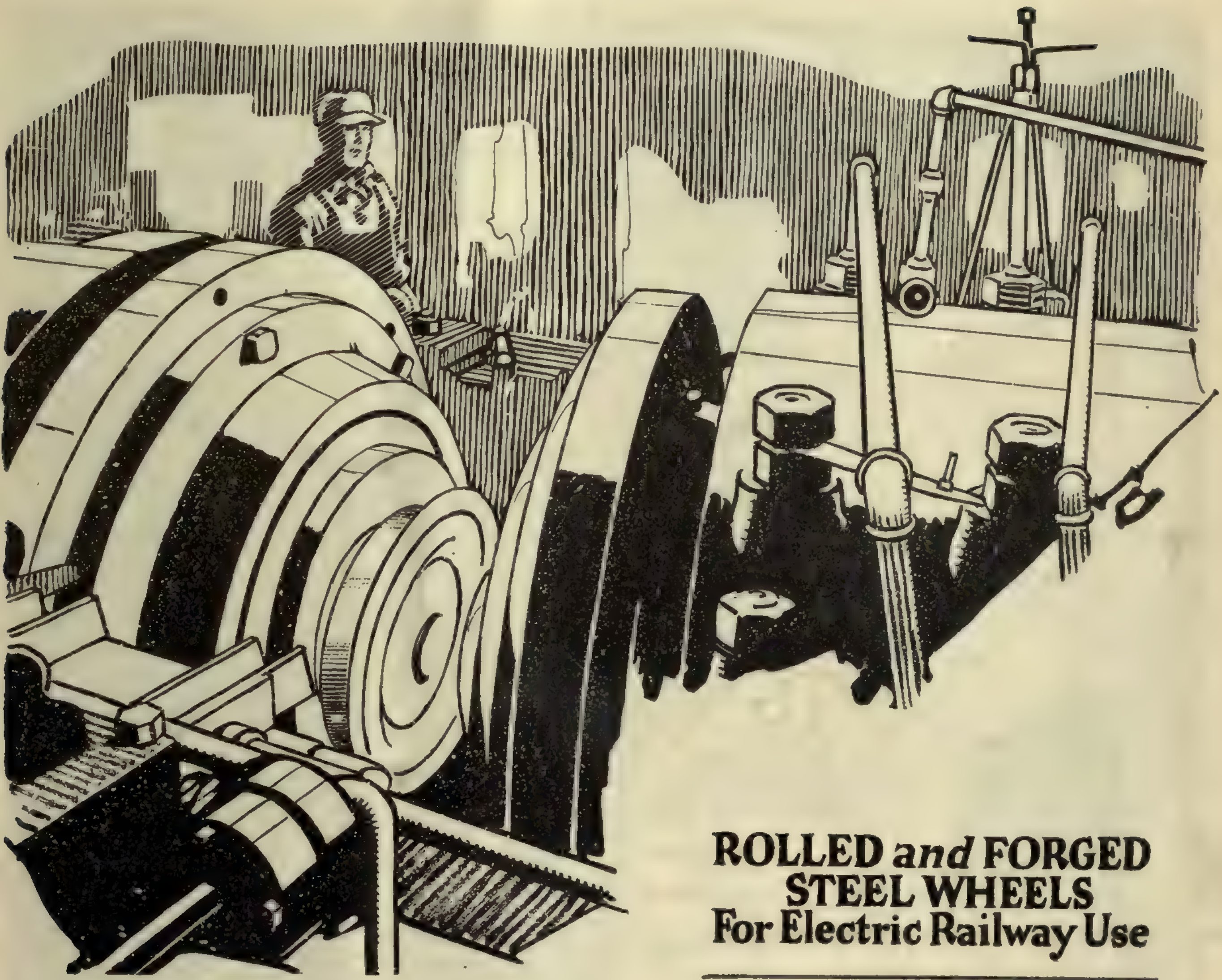


Better Service at Lower Cost

"Agasote" For Roofing—Headlining—Wainscoting
(Trade-Mark)

THE PANTASOTE COMPANY

11 Broadway, N. Y. People's Gas Bldg., Chicago, Ill. 751 Monadnock Bldg., San Francisco, Calif.



ROLLED *and* FORGED STEEL WHEELS For Electric Railway Use

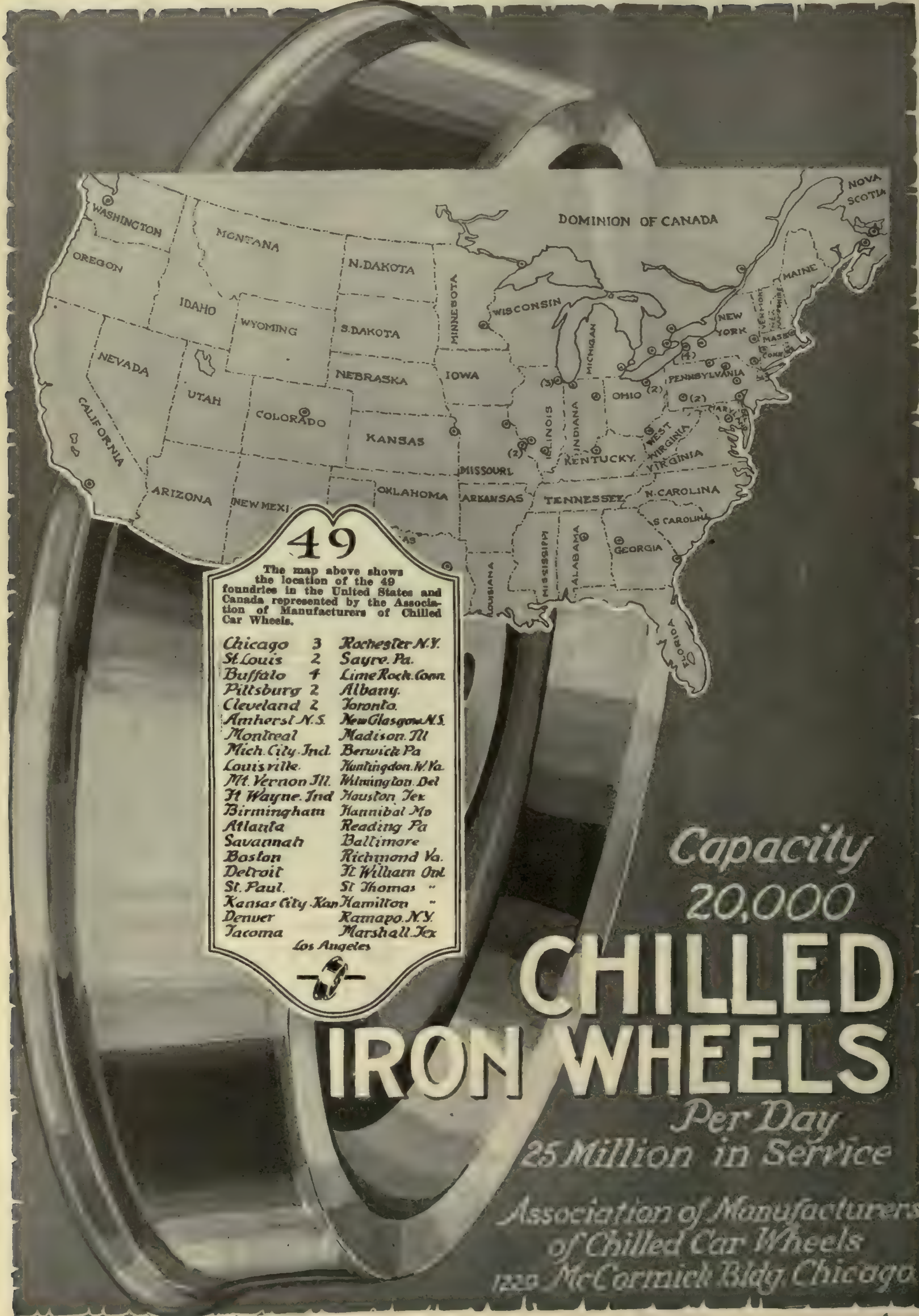
THE reasons why steel wheels made by our improved methods give superior service are numerous. Let us tell you the story in detail. Then ask the opinions of satisfied users.

General Sales Office:
WIDENER BUILDING, PHILADELPHIA, PA.

District Offices:
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit
New York, Philadelphia, Pittsburgh, San Francisco
Salt Lake City, Seattle, St. Louis

Sole Export Representative:
CONSOLIDATED STEEL CORPORATION
165 Broadway, New York

MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY



49

The map above shows the location of the 49 foundries in the United States and Canada represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago 3
St. Louis 2
Buffalo 4
Pittsburg 2
Cleveland 2
Amherst N.S.
Montreal
Mich. City Ind.
Louisville.
Mt. Vernon Ill.
Ft Wayne. Ind
Birmingham
Atlanta
Savannah
Boston
Detroit
St. Paul.
Kansas City Kan
Denver
Tacoma

Rochester N.Y.
Sayre. Pa.
Lime Rock. Conn
Albany.
Toronto.
New Glasgow N.S.
Madison. Ill
Berwick Pa
Huntingdon. W. Va.
Wilmington. Del
Houston. Tex
Hannibal Mo
Reading Pa
Baltimore
Richmond Va.
Ft William Ont
St Thomas "
Hamilton "
Ramapo. N.Y.
Marshall. Tex

Los Angeles

Capacity 20,000

CHILLED IRON WHEELS

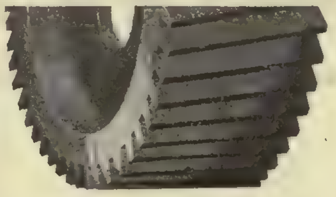
Per Day

25 Million in Service

Association of Manufacturers of Chilled Car Wheels
1220 McCormick Bldg. Chicago

Nuttall Helical Gears

A PROVEN SUCCESS



—"IT is the steady application of power without jar of vibration."

—"BECAUSE removing vibration reduces maintenance costs."

—"BECAUSE applying power through the overlapping form of tooth is the logical way to cut down noise and vibration."

—"BECAUSE it appeals to the mechanical sense."

—"THE principle is certainly correct."

THESE are the quotations of five mechanical men and they tell the reason why NUTTALL HELICAL GEARS have met with so much approval.

IN spite of hampered transportation conditions, we have been able to ship over 12,000 helical gears and pinions since October 1919.

R.D. NUTTALL COMPANY
PITTSBURGH AGMA PENNSYLVANIA

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

S BRAND *"The 'Standard' Brand on your material is an assurance of eventual economy."* S BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

500 NORTH BROAD ST., PHILADELPHIA, PA.

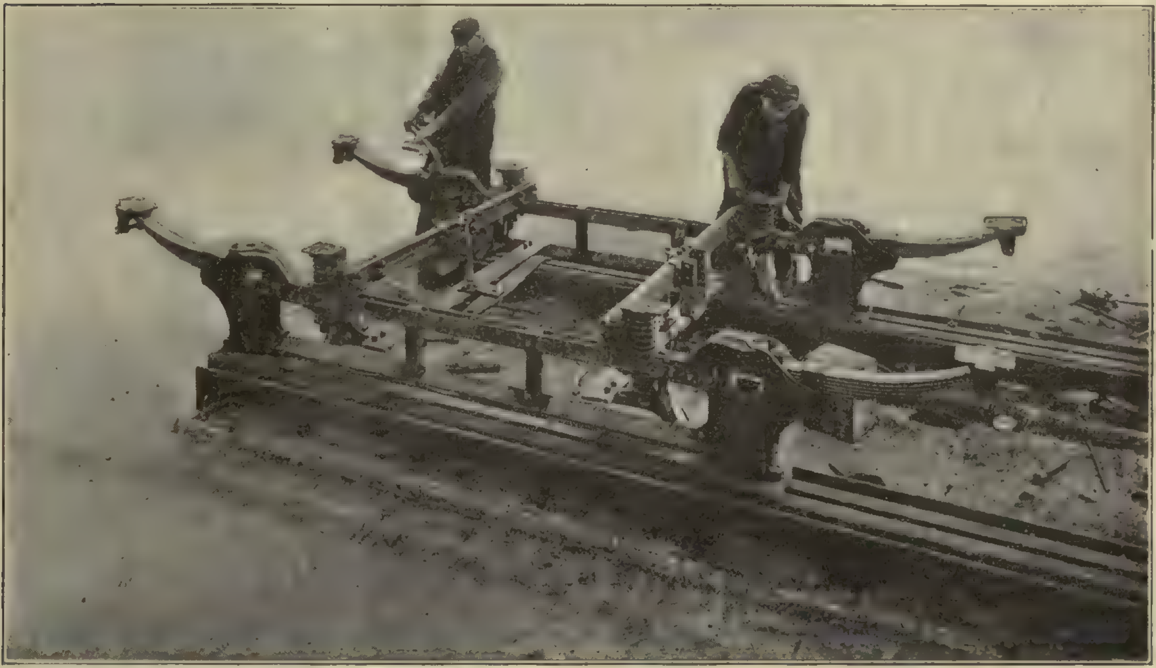
CHICAGO
ST. LOUIS
HAVANA, CUBA

RICHMOND
SAN FRANCISCO
NEW YORK
MONTEREY, MEX.

MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

Osgood Bradley Safety Cars

Have Smooth-Riding Trucks



When you go from big double-truck cars to the safety car with its single truck, you want to give the patron as smooth riding as he had before.

The Osgood Bradley Safety Car Truck has a system of spring suspension which its first users tell us is accomplishing all that we hoped to attain in the way of non-teetering, non-oscillating riding at spanking speeds. The spring system on which the body is carried includes a quarter elliptic spring at each end or corner of the truck and a set of spiral springs on each side of the truck adjacent to the pedestals.

This new arrangement of elliptics and spirals in combination with the sturdy structural design of the truck framing will prove to you and your public that there is such a thing as a fast-running single truck that does permit comfortable riding on any track good enough for double trucks. Osgood Bradley Safety Cars Are Long Life Cars.

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are made with the same care and high regard for quality which distinguishes the production of Okonite rubber insulation.

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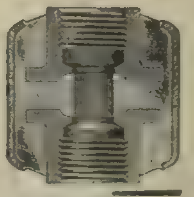

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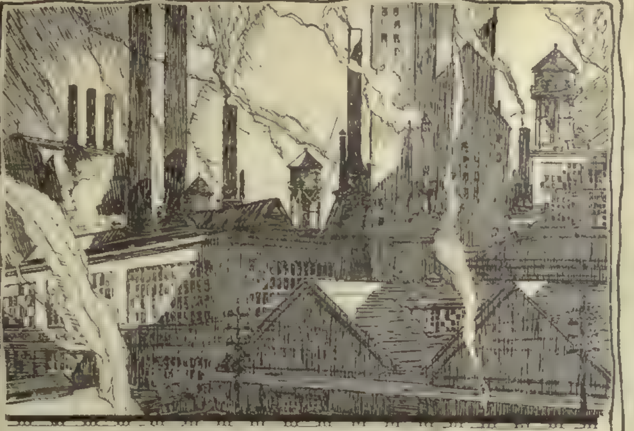

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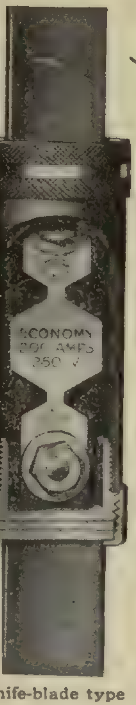

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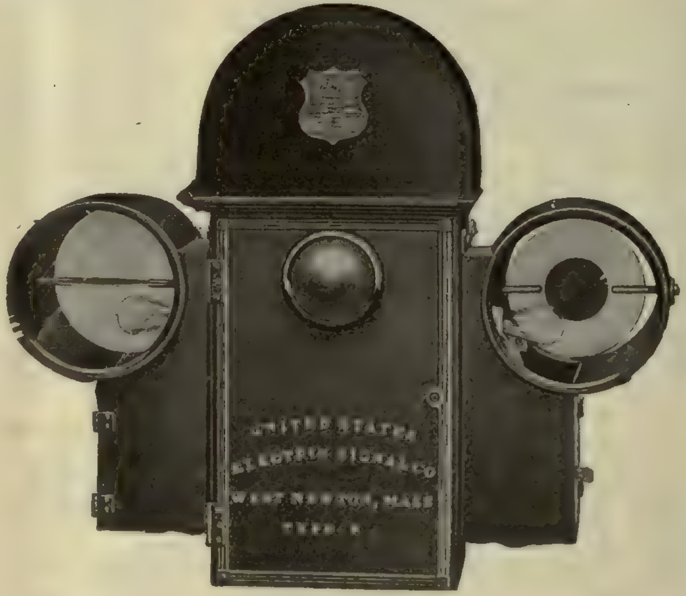

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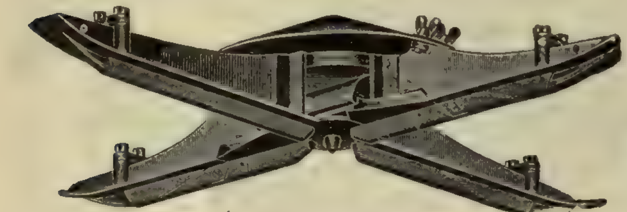

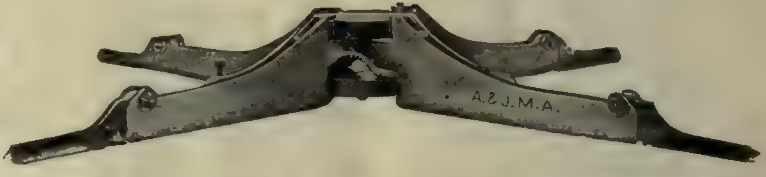

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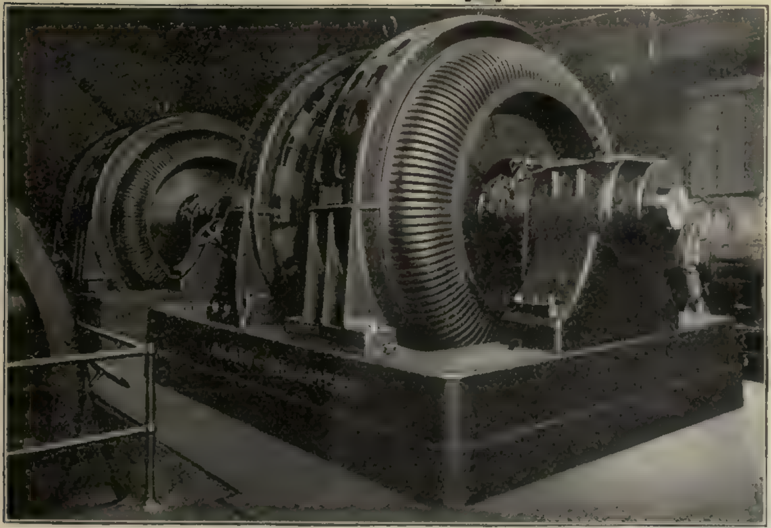

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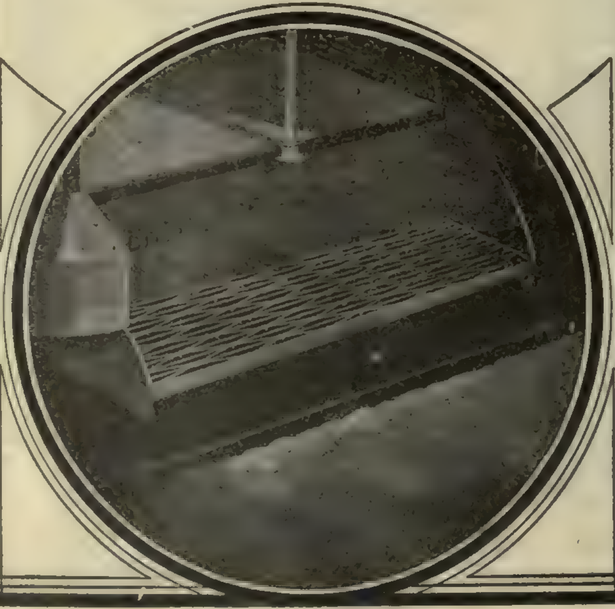

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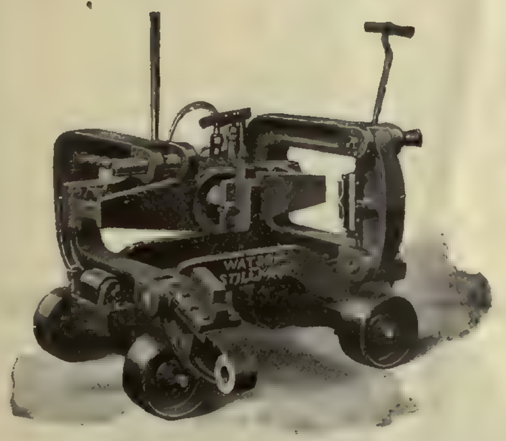

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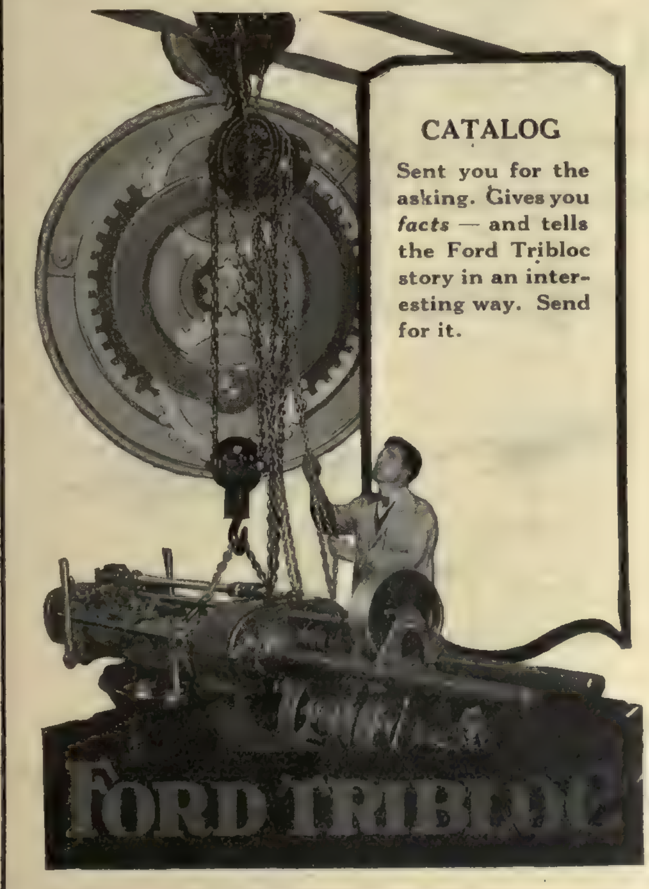

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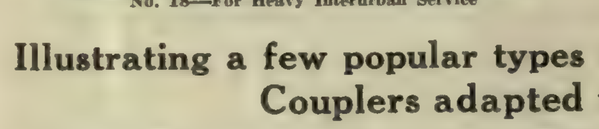

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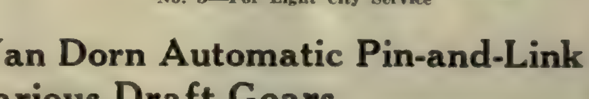

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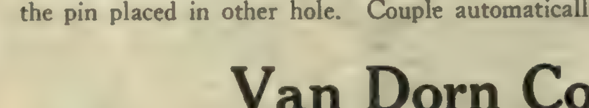

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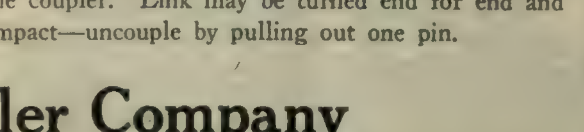

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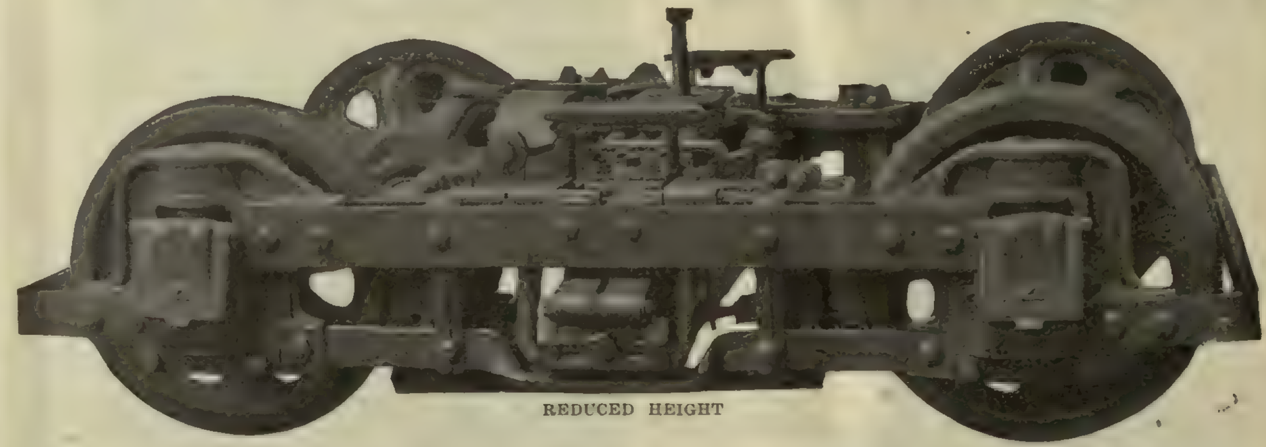

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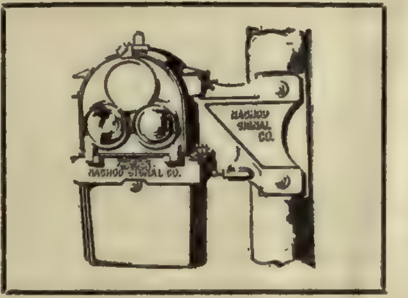
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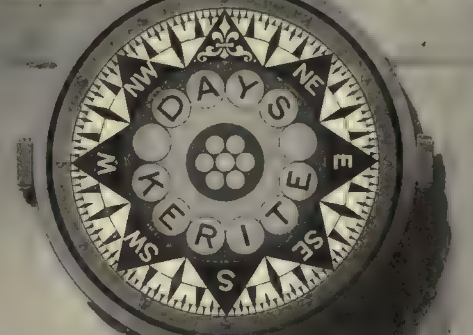

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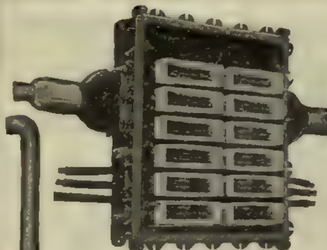

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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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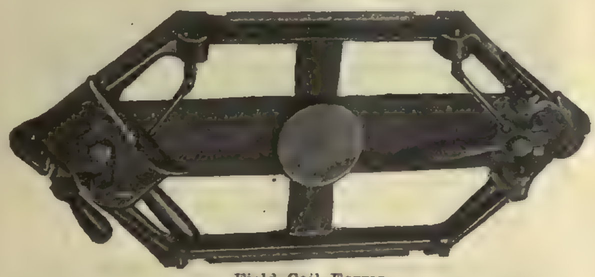

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Face Plate in winding machine can be used either in perpendicular or horizontal position

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The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods.
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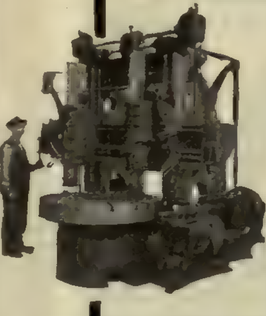

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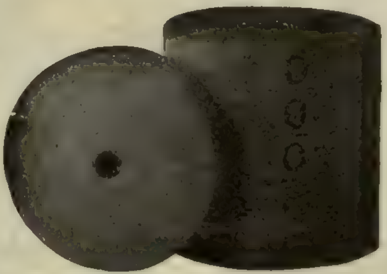

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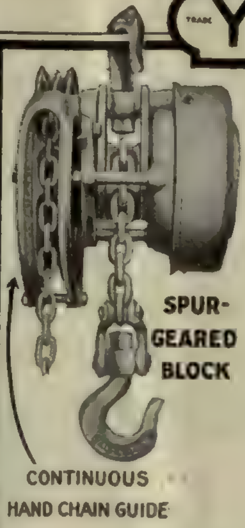

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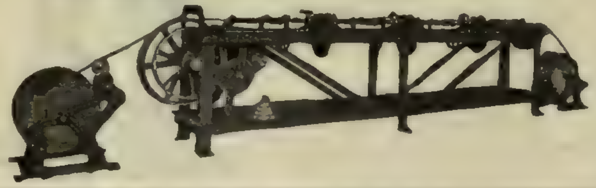

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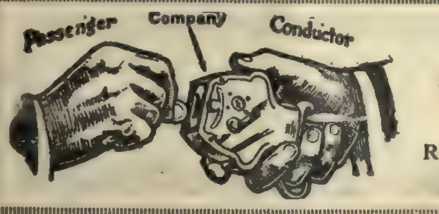

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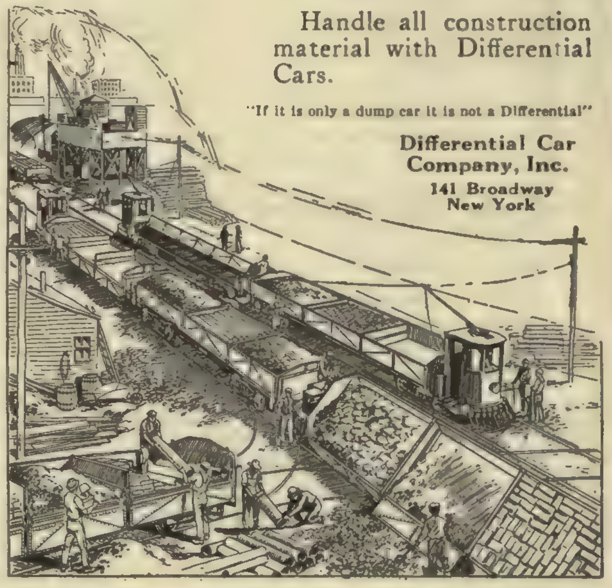

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have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

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75% of the electric railways
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Send for Catalog.
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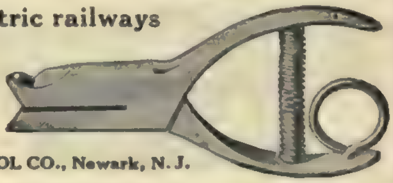

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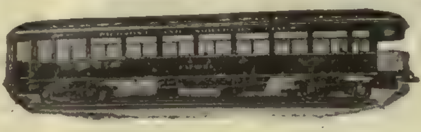

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Cars of all types from one-man to large interurban

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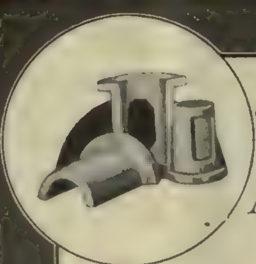

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Not always the cheapest, but ever lowest in ultimate cost

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The "Hycap-Exide" Battery
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STORAGE BATTERY
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THE ELECTRIC STORAGE BATTERY CO
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Wheel Condition No. 5

Especially for Removing Flat Spots

When the read and flange both need grinding you can do it without removing the car from service by using this type of wheel Truing Brake Shoe.

There are 500 different styles of patterns

Write for the list of roads using them.

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Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

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Give Longer and Better Service

THERE are more Bound Brook (Oil-less) Trolley Wheel Bushings in use today than all other makes combined. That is because Bound Brook Bushings, by virtue of their construction, invariably outlast all other types.

All Genuine Graphited Oil-less Bushings have always been made at Bound Brook, U. S. A.

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DAVIS STEEL WHEELS
Standard for Electric
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Think "SEARCHLIGHT" First

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ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

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EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

ARMATURE winder wanted. Experienced on Westinghouse 68 & 101 B. railway motors, also Westinghouse compressor armatures. Also to do controller work. Location New York state. State wages desired and experience in first letter. P-727 Elec. Ry. Journal.

ASSISTANT to Master Mechanic on large interurban and city property located in Southwest. Applicant must know the business and be able to do office work, drawings, etc. P-722, Elec. Ry. Journal, Old Colony Bldg., Chicago.

ELECTRICAL engineer wanted, with some experience in street railway work, in city in Middle West; state experience, references, and salary desired when replying. P-605, Elec. Ry. Journal, Old Colony Bldg., Chicago.

FIRST class street car mechanic wanted one experienced with mechanical and electrical equipment of street cars. Address Corpus Christi Railway & Light Company, Corpus Christi, Texas.

LARGE Interurban Railway is looking for man experienced in A. C. signaling on electric railways, who can take entire charge of signal department as Supervisor. Man with knowledge of telephones preferred; steady employment; good prospects. P. V. 725 Elec. Ry. Journal, Old Colony Bldg., Chicago.

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3—32-ft., 4-ft. 8½-in. ga. closed motor cars; seating capacity 32, Symington-Baldwin trucks. First Class. Will convert to one man operation if desired.

4—22-ft., 4-ft. 8½-in. ga., open trailers; seating capacity 35. Taylor McGuire trucks. Good.

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PERMANENT position open for several draftsmen with knowledge of street railway track work. New York Switch & Crossing Co., 15th and Madison Sts., Hoboken, N. J.

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ABLE engineering executive desires correspondence with officers or general managers of Class A or B property anticipating a change in personnel or type of organization; eight years' experience in design, erection, operation and maintenance of street and interurban railway rolling stock; five years' general operating experience; at present manager of a small property. PW-731, Elec. Ry. Journal, Old Colony Bldg., Chicago.

A CHANGE of position is desired by a young man experienced in street railway shop work; now engaged as assistant to superintendent of equipment. PW-715, Elec. Ry. Journ., Real Estate Trust Bldg., Philadelphia.

CAPABLE master mechanic of proven executive ability, seeks change. Present job and associates O. K. but desire broadre and associates O. K. but desire broader field. PW-729, Elec. Ry. Journal.

ENGINEER, construction and design power plants, sub stations and transmission lines, high and low voltages; 15 years' experience in all parts of country, including Alaska; age 33, single. PW-730, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

EXECUTIVE open for engagement, experienced in management and operation of railway and electric properties; thoroughly conversant with accounting, purchasing, finance, public policies, rates design and construction; references furnished if desired. PW-717, Elec. Ry Journ., Old Colony Bldg., Chicago.

POSITIONS WANTED

FOREMAN, age 34, 17 years' experience wiring, overhauling and maintenance of street railway equipment. Handle men to advantage. References past and present employers. PW-728, Elec. Ry. Journal.

MAN 20 years' experience as superintendent and Master Mechanic, thoroughly conversant with purchasing, finance, public policies and construction, successful in handling labor and maintaining discipline, now employed on small property, would consider either position in north and east. PW-726, Elec. Ry. Journal, Old Colony Bldg., Chicago.

WORKING barn foreman, single truck road preferred; can do any kind of wiring, controller repairs, and wind armatures; 12 years' experience both single and double truck. PW-732. Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

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Back Copies Wanted

I will pay 25 cents a copy for the following issues of Electric Railway Journal: Jan. 18, Feb. 1 and Feb. 8, 1919. W-733, Elec. Ry. Journal.

Salesmen Wanted

Sales agent wanted on commission basis to handle as a side line a product requiring no samples to carry but which product is an essential to all electric railways; large quantities should be used during the course of reconstruction; references exchanged. 978 Arcade, St. Louis, Mo.

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55 shares of stock in National Railway Appliance Co. of New York, at a bargain price. W. McK. White, 6712 Cornell Ave., Chicago, Ill.

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Twenty-Five Cycle Rotary Converters

2—300-kw. 3-phase, 25-cycle, 600-volt, General Electric rotary converters, complete with transformers, primary voltage 13,200, secondary 380-volts.

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20—G. E. 800's, complete with controllers.

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JOSEPH MYERSON, 411 Atlantic Ave., Boston 9, Mass.

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MACHINERY AND SUPPLIES
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Telephone 4337-4338 Rector

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the equipment or machinery
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Sell it *Before* depreciation *Scraps* it.

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5—Rotaries—300 K.W.

600 volt D.C., 25 cy. A.C. Trans. 15,000 volt, complete with Switchboards, Bood condition.

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Send for our used mach. list.

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Interurban Car

1—55 foot Combination Passenger and Express Car seating capacity 68. Built by Jewett Car Co., American Locomotive Trucks. Westinghouse No. 112 75 Hp. motors, double end control, 36 in. wheels standard gauge. Almost new and in perfect condition. Will make fine express car by removing seats. Available account too heavy for original purchaser's rails.

Immediate delivery—Indiana shipment
Will pass most rigid inspection.

Price, Indiana, $6,000

If interested write or wire

Wood and Lane Company
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Complete Power House and Sub Station Equipment

2—500 KW. 400 volt, 3 phase, 25 cycle, 125 R.P.M. Bullock A.C. Generator direct connected to 2—750 H.P. Allis-Chalmers Cross Compound Engines with Switchboard Instruments, Lightning Arrester, etc.
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Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

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6—50-FT.

Interurban Cars

Complete

Mounted on Standard C-60-P Trucks; 4 West. No. 56 Motors.

Electric Equipment Co.
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BUY NOW. There is a SCARCITY. We offer the following NEW RAILS for prompt shipment:

New 12-lb. and 30-lb. rails, splices, bolts and nuts.

New 90-lb. rails, angle bars, bolts, nuts and spikes.

They will be gone soon. Write or wire for our quotations.

Wire—300,000 lb. or more of copper trolley, feeder, high tension, etc.

A number of steel bridges on line of Cincinnati & Columbus Traction Co. For quick acceptance at $1.00 per 100 lb. as is. Photographs on request.

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On all kinds and sizes A.C. or D.C. motors and generators, starters, welders, controllers, or anything electrical. Quick shipment: from stock material, of coils commutators—shafts—bearings, etc. **Remember our initials stand for our product.**

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80 lb. RAIL & ACCESSORIES

ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

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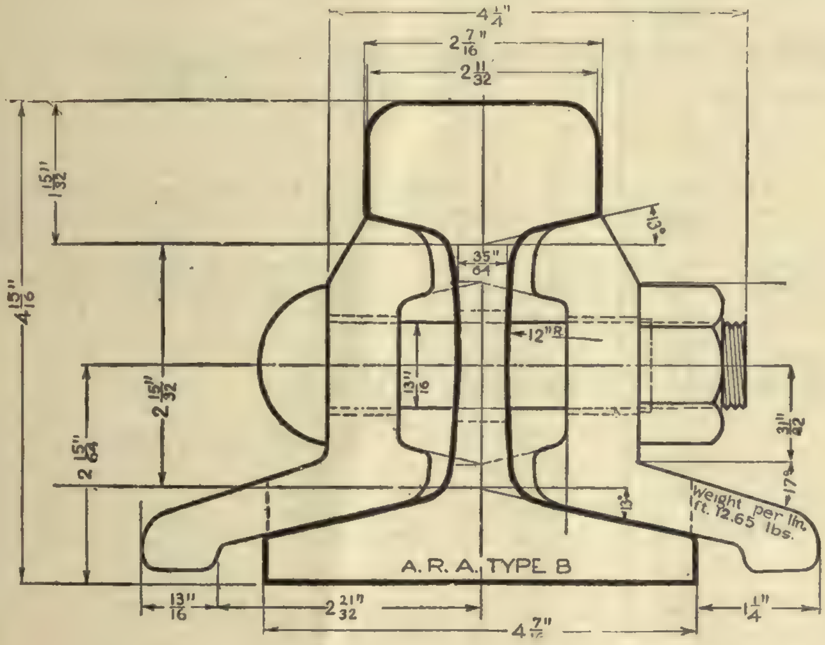
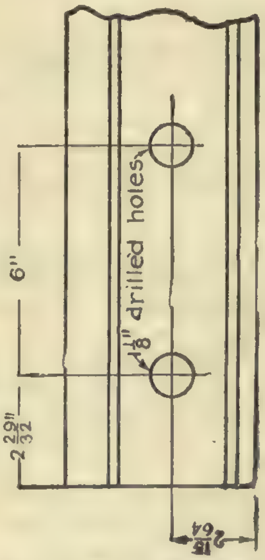
A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.





Note actual dimensions of rail stated hereon.

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New York Office
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We buy electric and steam railways that are to be dismantled

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2115 Railway Exchange Building

Machinery and Equipment for those Who Need It NOW

will be put up for sale at Public Auction on September 9th, 1920, at 11 A. M. at the Chicago Storage Depot. Catalogs with detailed information can be had upon application at either of the addresses given below.

The following, an approximate representative list, are some of the items. All machinery and equipment is of standard make and of stock sizes with a wide range of the latter.

This sale is a good chance to purchase good machinery at better than open market prices.

The machinery is there in both volume and variety, those who acquire it will indeed be fortunate —ACTION COUNTS.

Lathes	**138**	Among them 14 Gridley Automatics, 20 Lo-Swings, and 12 Gisholt Lathes.
Grinders	**63**	Of well known makes for cup, disc and tool grinding cylindrical and form cutting grinders.
Millers	**47**	Standard stock machines, horizontal, plain hand milling and external thread milling.
Blowers	**38**	Sturtevant, Buffalo, Canadian and other standard makes in good condition in a large range of sizes for varied purposes.
Screw Machines	**33**	Gridley and National Acme Automatics and others; plain head screw and hand screw.
Pumps	**70**	All standard makes; plunger, centrifugal and geared, some with motor stands, others belt driven; also a selection of steam pumps.
Presses	**68**	Hydraulic, piercing and nosing presses from 600 to 1200 tons capacity and a few smaller punch and stamp presses.
Drill Presses	**12**	Single to 4 spindle and high speed.

In addition there are small lots of other varied machinery as follows: Hammers, steam and air—Band Turners—Cut-Off Machines—Oil Coolers—Air Compressors—Core Machines—Spot Welders—Cold and Hack Saws—Bench Tappers—Sand Blast Machines—Shears and Wet Grinders.

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A number of single truck SHEAR SNOW PLOWS—equipped with motor—ready for next Winter's service
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2—203 hp. B. & W. Water tube boilers
1—266 hp. B. & W. Water tube boiler
1—600 hp. B. & W. Water tube boiler
1—300 hp. 22 in. x 48 in. Harris-Corliss Single Engine
1—500 hp. 28 in. x 36 in. Hamilton-Corliss Single Engine
1—1500 hp. 30 in. x 48 in. x 48 in. Penn-Corliss Cross Compound Engine
1—250 kw. W. H. Belted Multipolar D.C. Generator
1—400 kw. G. E. Eng. Type Multipolar D.C. Generator
1—850 kw. G. E. Eng. Type Multipolar D.C. Generator
Switchboard and Misc. Auxiliary equipment

NEWBURY, MASS.:

3—115 hp. Kendall Horizontal Return Tubular Boilers
2—14 in. x 28 in. x 36 in. Slater-Corliss Cross Compound Engines
2—250 kw. W. H. Eng. type Multipolar D.C. Generators
Switchboard and Misc. Auxiliary equipment

ESSEX, MASS.:

2—150 hp. Kendall Horizontal Return Tubular boilers
1—150 hp. new eng. horizontal return tubular boiler
2—13 in. x 23 in. x 22 in. McIntosh & Seymour Tan. Com. High Speed Engines
2—220 kw. Walker Eng. Type Multipolar D.C. Generators
1—55 kw. G. E. Direct connected 200 volt Booster Set.
1—150 hp. New Eng. Boiler
Switchboard and Misc. Auxiliary equipment

LAKEVILLE, MASS.:

3—250 hp. A. & T. Water Tube Boilers
1—16 in. x 30 in. x 42 in. Hamilton-Corliss Cross Compound Engine
1—325 kw. W. H. Eng. Type Multipolar D.C. Generator
Switchboard and Misc. Auxiliary equipment

SALEM, MASS.:

1—2500 A.B.H. G. E. Curtis Horizontal 60 Cycle, 445 volts A.C. Turbo, Generator and Direct connected Exciter
1—Alberger Spiroflo jet condenser and Auxiliaries.

HYDE PARK, MASS.:

3—500 hp. B. & W. Water Tube Boilers
1—1500 hp. 30½ in. x 52 in. x 48 in. Penn Cross Compound Engine
1—750 hp. 20 in. x 40 in. x 48 in. Greene Cross Compound Engine
1—700 hp. 20 in. x 40 in. x 42 in. Penn. Cross Compound Engine
1—850 kw. G. E. Direct Connected D.C. Generator
1—525 kw. G. E. Direct Connected D.C. Generator
1—500 kw. G. E. Direct Connected D.C. Generator
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WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
- Collier, Inc., Barron G.

Air Receivers
- Ingersoll-Rand Co.

Air Aftercoolers
- Ingersoll-Rand Co.

Ammeters
- Weston Elec'l Instrument Co.

Anchors, Guy
- Electric Service Supplies Co.
- Ohio Brass Co.
- Westinghouse Elec. & M. Co.

Angle Bars
- Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
- Green Engineering Company

Automobile and Buses
- Brill Co., The J. G.
- White Co., The

Axle Straighteners
- Columbia M. W. & M. I. Co.

Axles, Car Wheel
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Cambria Steel Co.
- Midvale Steel & Ordnance Co.
- Standard Steel Works Co.
- St. Louis Car Co.
- Taylor Electric Truck Co.
- Westinghouse Elec. & M. Co.

Babbitt Metal
- Ajax Metal Co.
- More-Jones B. & M. Co.

Babbitting Devices
- Columbia M. W. & M. I. Co.

Badges and Buttons
- Electric Service Supplies Co.
- International Register Co., The

Bankers & Brokers
- Coal & Iron National Bank

Batteries, Dry
- National Carbon Co.

Batteries, Storage
- Electric Storage Battery Co.
- National Carbon Co.

Bearings and Bearing Metals
- Ajax Metal Co.
- Bemis Car Truck Co.
- Brady Brass Co.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- More-Jones Brass & Metal Co.
- St. Louis Car Co.
- Taylor Electric Truck Co.
- Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
- Stucki Co., A.

Bells and Gongs
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- St. Louis Car Co.

Benders, Rail
- Niles-Bement-Pond Co.
- Watson-Stillman Co.
- Zelnicker, Walter A., Supply Co. Inc.

Boilers
- Babcock & Wilcox Co.

Boiler Tubes
- National Tube Co.

Bond Testers
- American Steel & Wire Co.
- Rail Welding & Bonding Co.

Bonding Apparatus
- American Steel & Wire Co.
- Electric Railway Improvement Co.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Rail Welding & Bonding Co.

Bonds, Rail
- American Steel & Wire Co.
- Copper Clad Steel Co.
- Electric Railway Improvement Co.
- Electric Service Supplies Co.
- General Electric Co.
- Ohio Brass Co.
- Rail Welding & Bonding Co.
- Westinghouse Elec. & M. Co.

Book Publishers
- McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
- Niles-Bement-Pond Co.

Brackets and Cross Arms, (See also Poles, Ties, Posts, Etc.)
- American Bridge Co.
- Bates Expanded Steel Truss Co.
- Creaghead Eng. Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Hubbard & Co.
- Ohio Brass Co.

Brake Adjusters
- National Railway Appliance Co.
- Westinghouse Traction Brake Co.

Brake Shoes
- Amer. Brake Shoe & Fdry. Co.
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.
- Taylor Electric Truck Co.
- Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
- Ackley Brake & Supply Corp.
- Allis-Chalmers Mfg. Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- National Brake Co.
- Safety Car Devices Co.
- St. Louis Car Co.
- Taylor Electric Truck Co.
- Westinghouse Traction Brake Co.

Bricks, Fire
- Green Engineering Co.

Bridges and Buildings
- American Bridge Co.

Brushes, Carbon
- General Electric Co.
- Jeandron, W. J.
- Morganite Brush Co.
- United States Graphite Co.
- Westinghouse Elec. & M. Co.

Brushes, Graphite
- United States Graphite Co.

Brushes, Motor and Generator
- National Carbon Co.

Brush Holders
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.

Buckets
- Blaw-Knox Co.

Bunkers, Coal
- American Bridge Co.

Bushings, Case Hardened & Manganese
- Bemis Car Truck Co.

Bushings, Graphite & Wooden
- Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Calculating Machines
- Monroe Calculating Machine Co.

Carbon Brushes. (See Brushes, Carbon)

Carbons, Photographic and Projector
- National Carbon Co.

Car Panel Safety Switches
- Westinghouse Elec. & Mfg. Co.

Cars, Dump
- Differential Car Co.

Cars, Passenger, Freight, Express, etc.
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- Brill Co., The J. G.
- Cambria Steel Co.
- Kuhlman Car Co., G. C.
- McGuire-Cummings Mfg. Co.
- Midvale Steel & Ordnance Co.
- National Railway Appliance Co.
- Osgood Bradley Car Co.
- Thomas, Perley A.
- Wason Mfg. Co.

Cars, Second Hand
- Electric Equipment Co.

Car, Self-Propelled
- Electric Storage Battery Co.
- General Electric Co.

Castings, Brass, Composition or Copper
- Ajax Metal Co.
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- More-Jones Brass & Metal Co.

Castings, Funnel
- Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
- American Bridge Co.
- American Steel Foundries
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Standard Steel Works Co.
- St. Louis Car Co.
- Wharton, Jr. & Co., Inc., Wm.

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- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

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- Earll, Chas. I.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Wood Co., Chas. N.

Caustic Soda Cells
- National Carbon Co.

Ceiling, Car
- Pantasote Co.

Checking
- Industrial Protective Co.

Circuit Breakers
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
- Anderson Mfg. Co., A. & J. M.
- Bossert & Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Eureka Co.
- General Electric Co.
- Hubbard & Co.
- Klein & Sons, Matthias
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers Track—(See also Snow-Plows, Sweepers and Brooms)
- Brill Co., The J. G.
- Ohio Brass Co.

Clusters and Sockets
- General Electric Co.

Coal and Ash Handling—(See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
- Columbia M. W. & M. I. Co.
- Diamond Mfg. Co.
- Electric Service Supplies Co.

Coils, Armature and Field
- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- Diamond Mfg. Co.
- General Electric Co.
- Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & M. Co.

Coin-Counting Machines
- Electric Service Supplies Co.
- International Register Co., The
- Johnson Fare Box Co.

Commutator Slotters
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
- General Electric Co.

Commutators or Parts
- Cameron Electrical Mfg. Co.
- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Compressors, Air
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Ingersoll-Rand Co.
- Westinghouse Trac. B. Co

Compressors, Gas
- Ingersoll-Rand Co.

Concrete Mixers
- Blaw-Knox Co.

Condensers
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Conduit Fittings
- Chicago Fuse Mfg. Co.

Conduits, Underground
- Standard Underground Cable Co.

Condulets, or Conduit Fittings
- Crouse-Hinds Co.

Connectors, Solderless
- Frankel Connector Co.
- Westinghouse Elec. & Mfg. Co.

Controller Fingers
- Eureka Co.
- Russell Mfg. Co.

Controllers or Parts
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Russell Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

Controller Regulators
- Electric Service Supplies Co.

Controlling Systems
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Converters, Rotary
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
- Portable Machinery Co.

Conveyors, Coal & Ash
- Green Eng. Co.
- Portable Machinery Co.

Conveyors, Portable
- Portable Machinery Co.

Conveying and Hoisting Machinery
- American Bridge Co.
- Columbia M. W. & M. I. Co.
- Green Engrg. Co.

Copper Wire
- Anaconda Copper Mining Co.
- Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
- Brill Co., The J. G.
- Electric Service Supplies Co.
- International Register Co., The
- Roeblings Sons Co., John A.
- Samson Cordage Works

Cord Connectors and Couplers
- Electric Service Supplies Co.
- Samson Cordage Works
- Wood Co., Chas. N.

Couplers, Car
- Brill Co., The J. G.
- Ohio Brass Co.
- Van Dorn Coupler Co.
- Westinghouse Trac. B. Co.

Cranes
- Allis-Chalmers Mfg. Co.
- Niles-Bement-Pond Co.
- Thew Automatic Shovel Co.
- Toledo Bridge & Crane Co., The

Creosoting. (See Wood Preservatives)

Cross Arms. (See Brackets)

Crossing Foundations
- International Steel Tie Co.

Crossings, Frogs and Switches
- Wharton, Jr. & Co., Inc., Wm.

Crossing Signals. (See Signals, Crossing)

Crossings, Track. (See Track, Special Work)

Crushers, Rock
- Allis-Chalmers Mfg. Co.

Curtains and Curtain Fixtures
- Brill Co., The J. G.
- Electric Service Supplies Co.
- Pantasote Co.

Cutouts
- Chicago Fuse Mfg. Co.

Dealers' Machinery
- Archer & Baldwin
- Cleveland Armature Wks.
- Electric Equipment Co.
- Foster Co., L. B.
- Griswold Machine Co., Geo. M.
- Hyman Michaels Co.
- Zelnicker Supply Co., Inc., Walter A.

Derailing Devices. (See also Track Work)
- Cleveland Frog & Crossing Co.

Destination Signs
- Columbia M. W. & M. I. Co.
- Creaghead Eng. Co.
- Electric Service Supplies Co.

Detective Service
- Wish Service, P. Edward

Dogs, Lathe
- Williams & Co., J. H.

Door Operating Devices
- Consolidated Car Heating Co.
- National Pneumatic Co., Inc.
- Safety Car Devices Co.

Doors and Door Fixtures
- Brill Co., The J. G.
- General Electric Co.

Doors, Folding Vestibule
- National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
- Ingersoll-Rand Co.

Drills, Track
- American Steel & Wire Co.
- Electric Service Supplies Co.
- Niles-Bement-Pond Co.
- Ohio Brass Co.

Drinking Cups, Sanitary Paper
- Individual Drinking Cup Co., Inc.

Dryers, Sand
- Electric Service Supplies Co.
- Zelnicker Supply Co., Walter A., Inc.

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- Roebling's Sons Co., J. A

Electrodes
- National Carbon Co.

Engineers, Consulting, Contracting and Operating
- Allison & Co., J. E.
- Archbold-Brady Co.
- Arnold Co., The
- Clark Management Corp., E. W
- Drum & Co., A. L.
- Engel & Hevener
- Feustel, Robert M.
- Ford, Bacon & Davis
- Hemphill & Wells
- Holst, Englehardt W.
- Jackson, Walter
- Jacobs & Co., J. L.
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  - Ingersoll-Rand Co.
  - Westinghouse Elec. & Mfg. Co.
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  - Wharton, Jr. & Co., Inc., Wm.
- **Fabricated Steel**
  - Blaw-Knox Co.
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  - Cleveland Fare Box Co.
  - Johnson Fare Box Co.
  - National Railway Appliance Co.
  - Ohmer Fare Register Co.
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  - American Steel & Wire Co.
- **Fenders and Wheel Guards**
  - Brill Co., The J. G.
  - Cleveland Fare Box Co.
  - Consolidated Car Fender Co.
  - Electric Service Supplies Co.
  - Star Brass Works.
- **Fibre and Fibre Tubing**
  - Continental Fibre Co.
  - Westinghouse Elec. & Mfg. Co.
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- **Filters, Water**
  - Scaife & Sons Co., Wm. B.
- **Fire Extinguishing Apparatus**
  - Castle Inc., James M.
- **Flashlights**
  - National Carbon Co.
- **Floodlights**
  - Crouse-Hinds Co.
  - Electric Service Supplies Co.
- **Flooring Composition**
  - American Mason Safety Tread Co.
- **Flooring, Grating**
  - Irving Iron Wks.
- **Forgings**
  - Columbia M. W. & M. I. Co.
  - Eureka Co.
  - Standard Steel Works Co.
  - Williams & Co., J. H.
- **Frogs, Track. (See Track Work)**
- **Fuses and Fuse Boxes**
  - Chicago Fuse Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Westinghouse Elec. & Mfg. Co.
  - Williams & Co., J. H.
- **Fuses, Refillable**
  - Columbia M. W. & M. I. Co.
  - Economy Fuse Mfg. Co.
  - General Electric Co.
- **Gages, Oil and Water**
  - Ohio Brass Co.
- **Gaskets**
  - Power Specialty Co.
  - Westinghouse Traction Brake Co.
- **Gas-Electric Cars**
  - General Electric Co.
- **Gas Producers**
  - Westinghouse Elec. & Mfg. Co.
- **Gates, Car**
  - Brill Co., The J. G.
- **Gear Blanks**
  - Standard Steel Works Co.
- **Gear Cases**
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
  - Westinghouse Elec. & Mfg. Co.
- **Gears and Pinions**
  - Ackley Brake & Supply Corp.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
  - General Electric Co.
  - National Railway Appliance Co.
  - Nuttall Co., R. D.
- **Generating Sets, Gas-Electric**
  - General Electric Co.
- **Generators**
  - English Electric Co., Ltd.
  - General Electric Co.
  - Westinghouse Elec. & Mfg. Co.
- **Gongs. (See Bells and Gongs)**
- **Graphite**
  - Morganite Brush Co.
- **Grates, Chain**
  - Green Eng. Co.
- **Greases. (See Lubricants)**
- **Grinders and Grinding Supplies**
  - Indianapolis Switch & Frog Co.
  - Metal & Thermit Corp.
  - Railway Track-work Co.
- **Grinding Blocks and Wheels**
  - Railway Track-work Co.
- **Guards, Trolley**
  - Electric Service Supplies Co.
  - Ohio Brass Co.
- **Guy Anchors**
  - Crouse-Hinds Co.
- **Harps, Trolley**
  - Anderson M. Co., A. & J. M.
  - Bayonet Trolley Harp Co.
  - Electric Service Supplies Co.
  - Hensley Trolley & Mfg. Co.
  - More-Jones B. & M. Co.
  - Nuttall Co., R. D.
  - Star Brass Works
- **Headlights**
  - Electric Service Supplies Co.
  - General Electric Co.
  - Ohio Brass Co.
  - St. Louis Car Co.
- **Headlining**
  - Pantasote Co.
- **Heaters, Car (Electric)**
  - Consolidated Car Heating Co.
  - Gold Car Heating & Lighting Co
  - National Railway Appliance Co
  - Smith Heater Co., Peter
- **Heaters, Car, Hot Air and Water**
  - Cooper Heater Co.
  - Smith Heater Co., Peter
- **Heaters, Car (Stove)**
  - Electric Service Supplies Co.
  - Smith Heater Co., Peter
- **Hoists and Lifts**
  - Columbia M. W. & M. I. Co.
  - Ford-Chain Block Co.
  - Niles-Bement-Pond Co.
  - Toledo Bridge & Crane Co., The
  - Yale & Towne Mfg. Co.
- **Hose**
  - Ingersoll-Rand Co.
- **Hose, Bridges**
  - Ohio Brass Co.
- **Hydraulic Machinery**
  - Niles-Bement-Pond Co.
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- **Inspection**
  - Electrical Testing Lab's
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  - Economy Electric Devices Co.
  - General Electric Co.
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  - Weston Elec'l Instrument Co.
- **Insulating Cloth, Paper and Tape**
  - Anchor Webbing Co.
  - General Electric Co.
  - Hope Webbing Co.
  - Okonite Co., The
  - Standard Underground Cable Co.
  - U. S. Rubber Co.
  - Westinghouse Elec. & Mfg. Co.
- **Insulating Machinery**
  - American Insulating Machinery Co.
- **Insulation. (See also Paints)**
  - Anderson M. Co., A. & J. M.
  - Drew Electric & Mfg. Co.
  - Electric Ry. Equipment Co.
  - Electric Service Supplies Co.
  - General Electric Co.
  - Mitchell-Rand Mfg. Co.
  - Okonite Co., The
  - U. S. Rubber Co.
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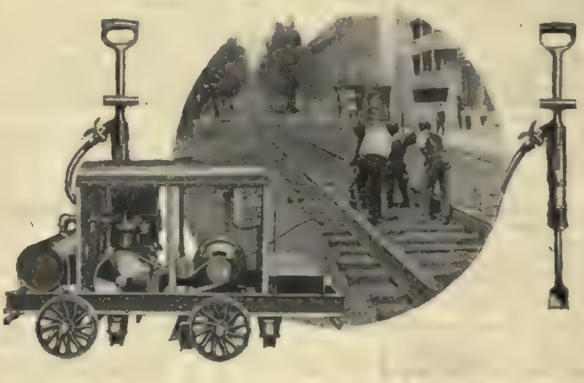

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Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
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SAFETY MIRRORS

Eliminate Accidents

Send for catalogue No. 18

DREW ELECTRIC & MFG. CO.
Collamer Ave. and Nickel Plate Railroad, Cleveland, O.

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N C C

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41720

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Armature and field coils
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Commutators
Controller handles
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G. C. KUHLMAN CAR CO. — CLEVELAND, OHIO.
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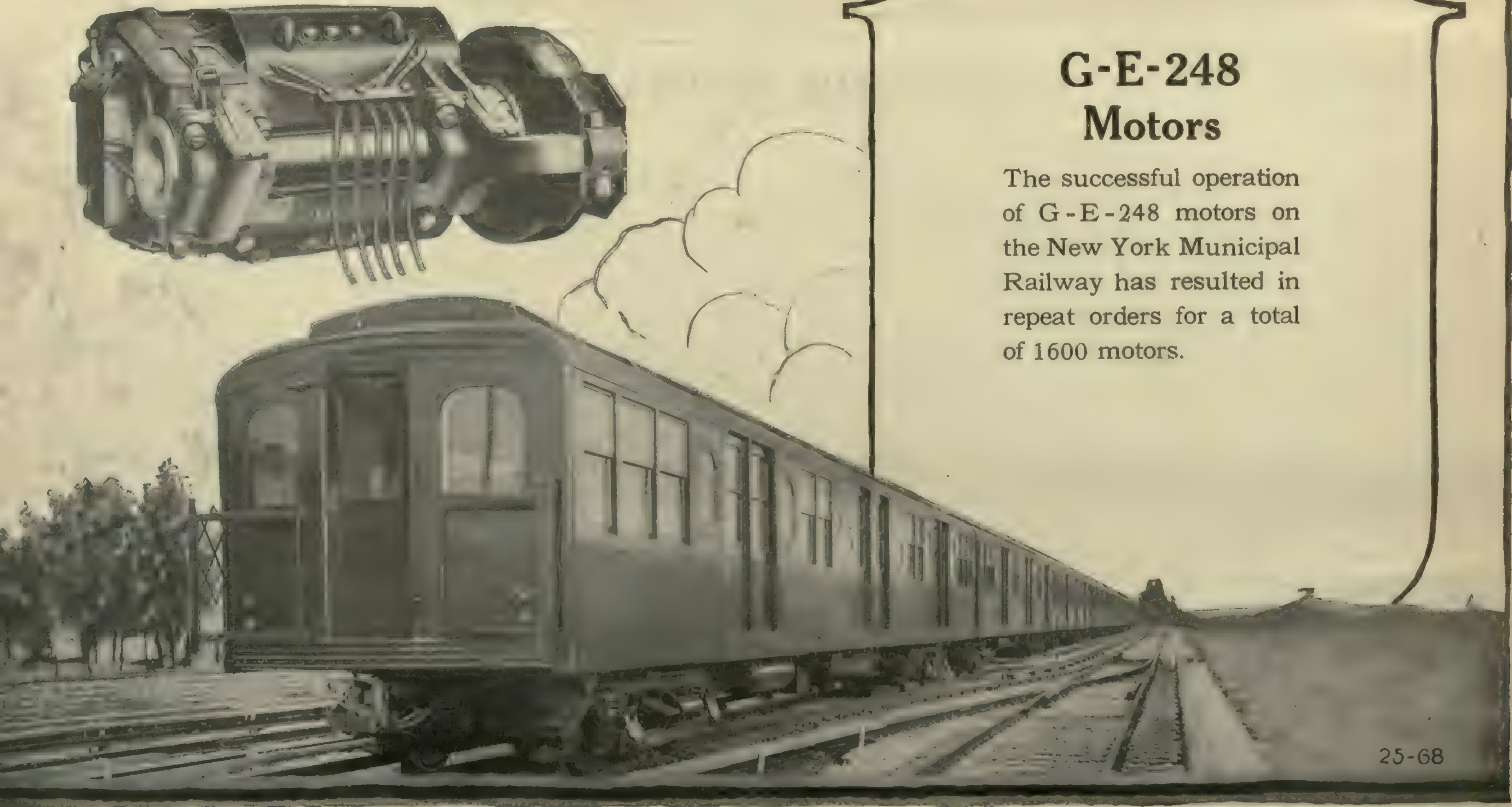

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25-68

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Ten years ago we said "H-L" Type of control was destined to become the standard of the country. Nearly 250 roads have adopted this form of control during that period.

The great net-work of the New York Municipal Subway and the Manhattan Island Elevated and Subways alone, have purchased approximately 1600 equipments. The Cambridge Subways and the latest cars on the Boston Elevated also use this form of control.

"H-L" form of control, we repeat, is destined to become the standard of the country. It does not grow old or obsolete.—It was designed on the Unit-Switch plan with this in mind.—All parts are standard and improvements, made from time to time, can be adopted without changing of major parts.

HL Control does not wear out—Ask the roads using it.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

W
WESTINGHOUSE ELECTRIC

Westinghouse

Vol. 56, *No.* 11 New York, September 11, 1920 *Pages* 487-528

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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Circulation of this issue, 6,700 copies

Advertising Indexes—Alphabetical, 54; Classified, 48, 50, 52; Searchlight Section 44-47

Type CR Trolley Frogs

The Trolley Wheel Never Travels On Its Flanges

Type CR Frogs can be installed nearer to a point directly over the track switch point than any other type. This increases the life of the trolley wire on the straight line approaching the frog, by reducing the grind of the trolley wheel riding angularly at this point.

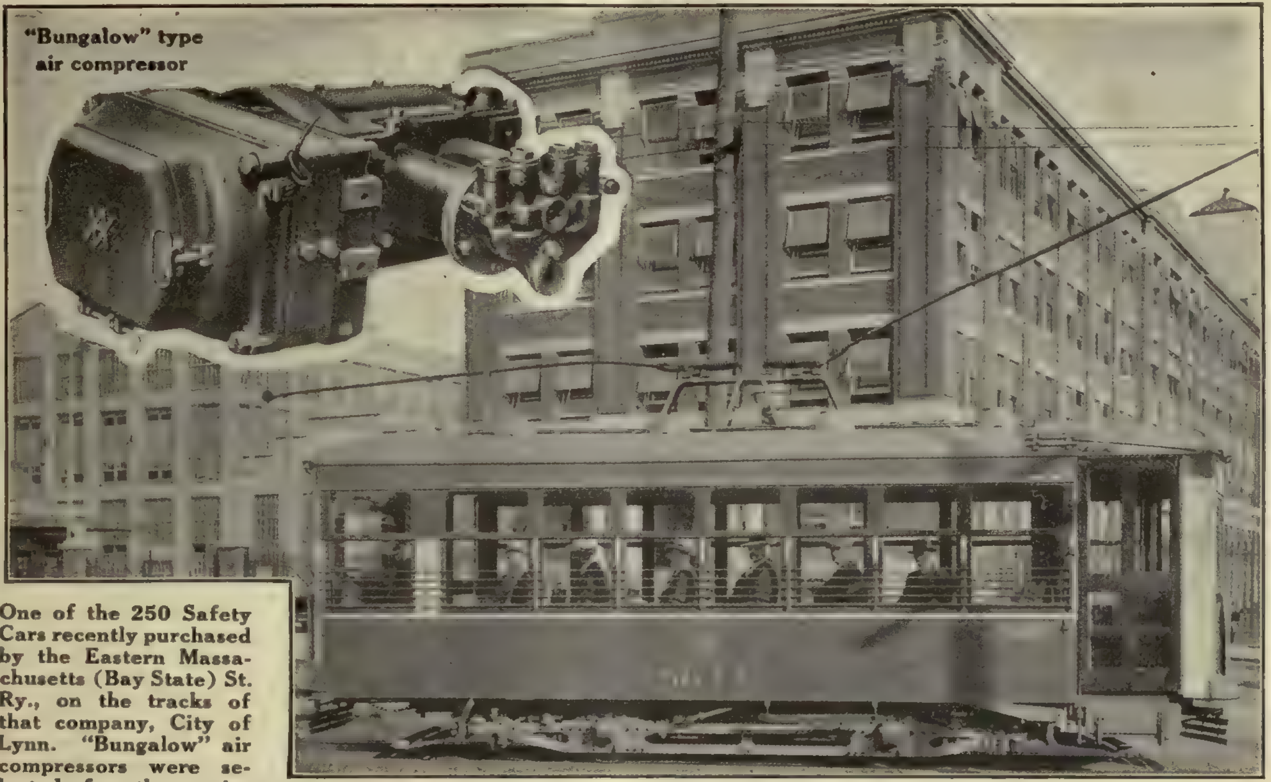
There is no bump to the wheel while passing under Type CR Frogs. Higher speeds can be maintained on account of a practically continuous contact of the tread of the wheel during the period of transition.

Trolley wheels last longer when operating with Type CR Frogs, as the flange is less subject to frictional wear.

W
WESTINGHOUSE ELECTRIC

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Westinghouse



One of the 250 Safety Cars recently purchased by the Eastern Massachusetts (Bay State) St. Ry., on the tracks of that company, City of Lynn. "Bungalow" air compressors were selected for the entire 250 cars.

The Superior Merits of Bungalow Air Compressors Place 250 on Largest St. Ry. Line

The Public Trusteeship managers of the Eastern Massachusetts (Bay State) St. Ry., having in mind the best interest of the traveling public, also recognizing the superior merits of the Bungalow Air Compressor, have selected Bungalow Air Compressors on its recent orders for 250 Safety cars. The compact, low-built design and its highly satisfactory performance, especially adapt the "Bungalow" air compressor to "Safety" car service. It has been included in all the largest installations. Over 3306 Safety Cars now running on 185 different electric lines throughout the United States are equipped with Bungalow air compressors.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

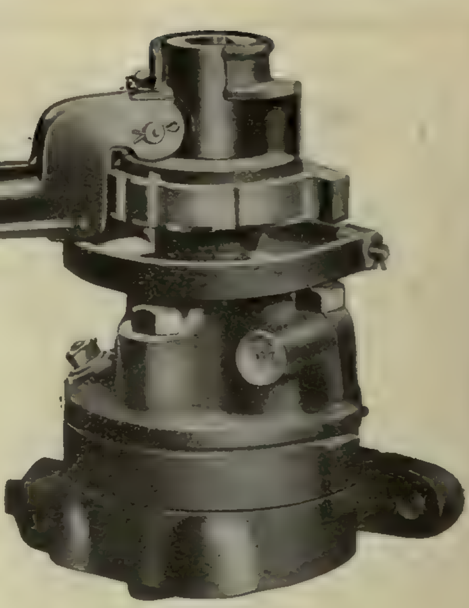
TRADE MARK

New York
San Francisco

Washington

Chicago
St. Louis

What Better Reasons Than These For Norfolk's Decision To Buy 50 Safety Cars?



Upon recommendation of its expert, A. Merritt Taylor, the City Council of Norfolk, Va., has authorized the Virginia Railway & Power Company to purchase fifty more of the *same* SAFETY cars that have already made good on this company's property. Said Mr. Taylor:

> "I *emphatically recommend* that the company's proposition to provide 50 safety cars be promptly accepted.
>
> "Cost of operation of 50 safety cars will be much less than operation of 40 double-truck cars, which would be their practical equivalent. Thus the burden of car riders of Norfolk would be lightened to the extent of at least ½ cent and 1 cent a passenger (Note: double-truck cars would have cost $420,000, safeties only $332,500).
>
> "Operation of safety cars will furnish more frequent and efficient transportation at less cost than the operation of double-truck cars; frequency of service will be increased by safety cars at least 25% and schedule running time will be materially decreased owing to quick stopping and quick starting of safety cars, which is impracticable with the heavy double-truck cars.
>
> "Operation of safety cars with at least 25% greater frequency than double-truck cars in giving the public better service will increase the riding habit and gross earnings of the company, in addition to decreasing the cost of furnishing transportation, and thereby tend to keep the rate of fare down to a minimum by providing more and better service, which will produce more rides per capita."

These cars will be genuine *Safety Cars* because they will be equipped with the famous Safety Devices combination of this company.

SAFETY CAR DEVICES COMPANY

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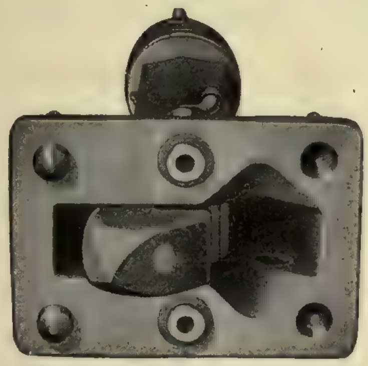
CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.

Tomlinson Spring Draw Bar Carriers take care of severe breaks in grade without undue strain on car sills.

Pulling Crowds Over the Peak with Tomlinson Automatic Couplers



End-on View of Form 8 Coupler—note Air Connecting Gaskets.

5 Point Electric Couplers mounted on Tomlinson Air Connecting Car Couplers.

Train operation has become a necessity to handle rush hour travel. Tomlinson Automatic Couplers have become a necessity to train operation.

Cars, air lines and electric lines are connected automatically and simultaneously without sending a man between the cars.

A pull of a chain at the side of the car does the uncoupling.

Tomlinson Couplers operate as a single unit from anchorage point to anchorage point without strain on car frame, air hose or electric conduit.

Many unusual and interesting applications have been made. The interlocking possibilities for signals, braking, door operation seem unlimited. The specialized knowledge of our engineers is yours for the asking.

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The Phono-Electric lasted six years, and during that time the copper wire was renewed twice, the third copper wire being taken down at the same time that the Phono-Electric was first renewed.

Phono-Electric

Lasted three times as
long as the copper

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Bridgeport Connecticut

63% for Bearing and 37% for Reinforcement

IN Steel Twin Ties the economical distribution of Steel under the work a tie is called on to do takes these percentages.

The larger proportion of the Steel goes into the Three-Foot by Thirteen-Inch Bearing Plates, which are Five-sixteenths Inch thick. Flanged sides provide for stresses in the plates and in combination with the Three-Foot-Long Bearing utilize all the Steel in them.

The smaller, but equally important, proportion goes into the Three-Inch Channels, which weigh Four Pounds to the foot.

They space the rail so accurately that no gauge is needed in laying Steel Twin Ties.

They also reinforce the track foundation at Three-Foot Intervals.

This efficient distribution of Steel is the fundamental principle of permanent, proved construction at less first cost than wood tie probabilities.

The International Steel Tie Company

Manufacturers of Steel Twin Ties and Crossing Foundations
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Steel Twin Tie Track

TONCAN METAL CORRUGATED CULVERTS

This carload shipment is typical of the many constantly being made by manufacturers of Toncan Metal Corrugated Culverts. We say "many" because more buyers are asking for Toncan Metal Culverts this year than ever before.

This should be of interest to buyers who have never used Toncan Metal Culverts, for this reason: It indicates plainly that Toncan Metal has made good as a culvert material. Its popularity has increased year by year.

And that's just it—Toncan Metal *has* made good. When it was put on the market years ago for use as a culvert material, we said it would resist rust. Today users know that it resists rust, for those culverts installed years ago are still in good condition.

SPC. TONCAN METAL

This trade mark on a corrugated culvert signifies that it is made of the genuine rust-resisting TONCAN METAL. Always look for it.

TONCAN METAL is also made into Roofing, Siding, Ventilators, Eaves Trough, Conductor Pipe and other sheet metal products.

Write for the name of the nearest Toncan Metal Corrugated Culvert Manufacturer.

THE STARK ROLLING MILLS, Canton, Ohio

Sole Makers of Toncan Metal

These Keystone Specialties are Standard Equipment on nearly all Safety Cars.

Golden Glow Headlights

Keystone Rotary Gongs

Keystone Air Sanders

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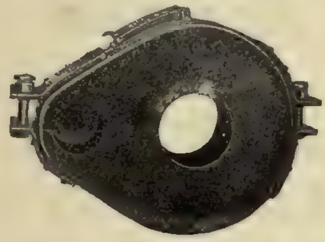
Faraday Car Signal Systems


Keystone Steel Gear Cases

Keystone-Hunter Destination Signs

Always specify them for they will serve you well. Write for Bulletin No. 167, showing many other Keystone specialties for use on safety cars.

Keystone Steel Gear Cases

Rightly named "The Cases of Service." They are made of the very best grade of soft, open-hearth, deep-drawing sheet steel that can be bought; sheets are both riveted and electrically spot-welded together; this, together with the grade of steel used, assures a strong, tight, rigid gear case, and one that stays strong, tight and rigid.

Nose brackets are solid castings, riveted to the case through six thicknesses of metal. Side brackets are of hot pressed steel, securely riveted to the case through four thicknesses of metal. Keystone bracket supporting systems are typical of the strength and durability of the entire case.

These cases are made for use with all types of motors including those used on safety cars.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

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17th and Cambria Streets

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Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

CHAPTER EIGHTEEN

THE ALL-*BUT* PERFECT STATE

Even the Best Shall Be Assessed

It is true that on this topsy turvy planet "them as has—gits." Yet in the All-But Perfect State it will be changed to "them as gits—pays."

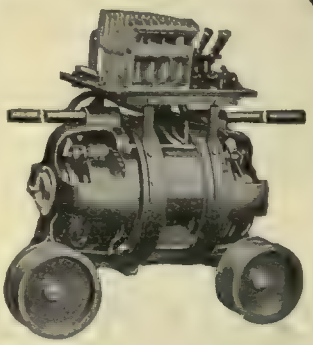
For when a road is urged to build an extension through a certain section its answer will be: "Here are the figures for the extension and the property benefited will be assessed so much."

This obtains at present for water, gas, electricity and surely transportation is just as big a factor as any one of these in developing any given territory. For a man may build the finest store in the land and if it is inaccessible to buyers the proprietor will find plenty of time to read the best sellers but no money to buy them.

Therefore those who benefit most from transportation will pay most.

The interests of the business men and the local railway will be so closely linked that they will be considered as one.

You see it is quite possible to bring two different elements into one. Witness the bringing of copper and steel into perfect fusion by the Dynamotor.



READING NUMBER EIGHTEEN

Q. Will the same Dynamotor used for bonding do work in the shop and will it weld rails?

A. Yes, a single Dynamotor can be arranged to do such all-over work. And then if you want it you can get special Dynamotors for bonding or for welding rails, or shop work.

You just state what work is to be done—we'll recommend the best machine.

Rail Welding and Bonding Company

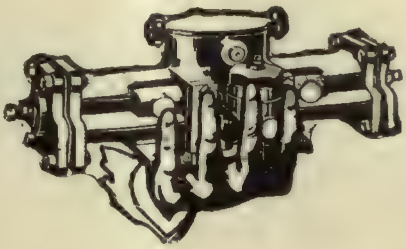
Formerly The Lincoln Bonding Co.

RW&B

Cleveland, Ohio.

NATIONAL PNEUMATIC

Standardize! *Pneumatize!*



To Get This Speed

The very instant you hear the click of the closing door, you *feel* that the car is on its way.

The conductor doesn't stop his collection of fare to tug at door levers and to pull at bell cords; nor does the motorman's brain require the hundredth of a second to comprehend and put the starting signal into *action.*

Nothing so slow is necessary when the unlimited power of compressed air and the lightning speed of electricity are there to do the work as embodied by

National Pneumatic Door and Step Control with the exclusive Safety Interlocking features that start the car automatically and instantaneously from the first notch of the controller.

Make Your Peak Periods Produce Maximum Profits and Efficiency

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

10 Years of Mountain Torrents

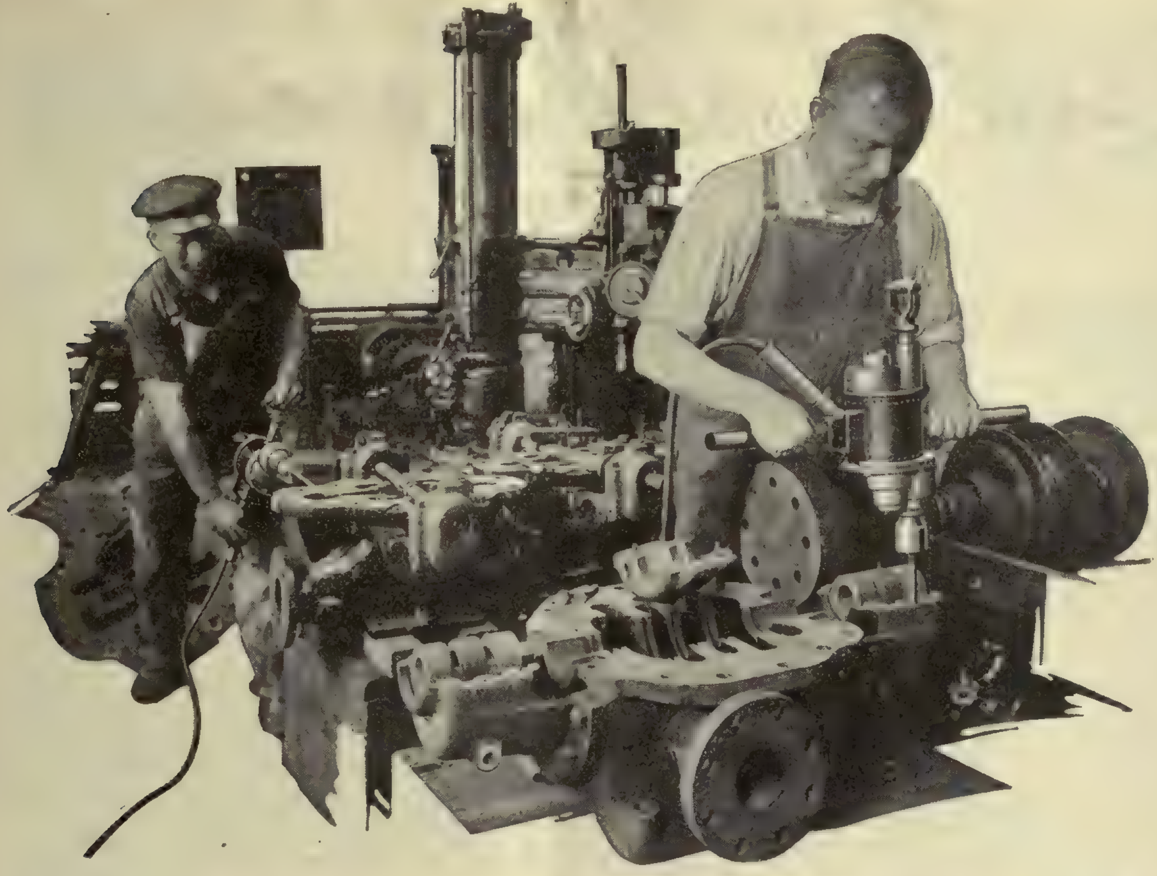
FOR 10 years mountain torrents, often loaded with debris, have given the enduring qualities of this 48 inch Armco Culvert a severe test, yet today, the culvert shows no signs of deterioration and is in as perfect condition as when installed in 1909.

Experienced Engineers and Highway Commissioners prefer Armco Culverts because of their enduring qualities and ease of installation.

There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting Armco Culverts and other products of American Ingot Iron such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

ARMCO
AMERICAN INGOT IRON
RESISTS RUST

ARMCO CULVERT & FLUME MFRS. ASSN.
TRANSPORTATION BLDG. CHICAGO



They take the tool to the job!

THERE are three ways to handle the job illustrated—

1—Hire extra labor to carry heavy castings to the expensive stationary machine in the background.

2—Slow up the work and increase man-hour costs by tedious hand drilling.

3—Hustle up the work, reduce tool expense, and lower man-hour costs by taking a Little Giant Portable Electric Drill to the job.

Little Giants don't stop with saving over hand or stationary drilling—they are *built* for and *give* lower-cost-per-year performance to the drill user who demands *cheaper drilling*—*not* cheaper drills.

Little Giants are not *orphans* by any means! They're backed by a nation-wide chain of Service Branches completely stocked with new tools and spare parts, and by the largest builder of portable electric tools in the world.

Ask for Booklet 397.

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*Sales and *Service Branches all over the World*

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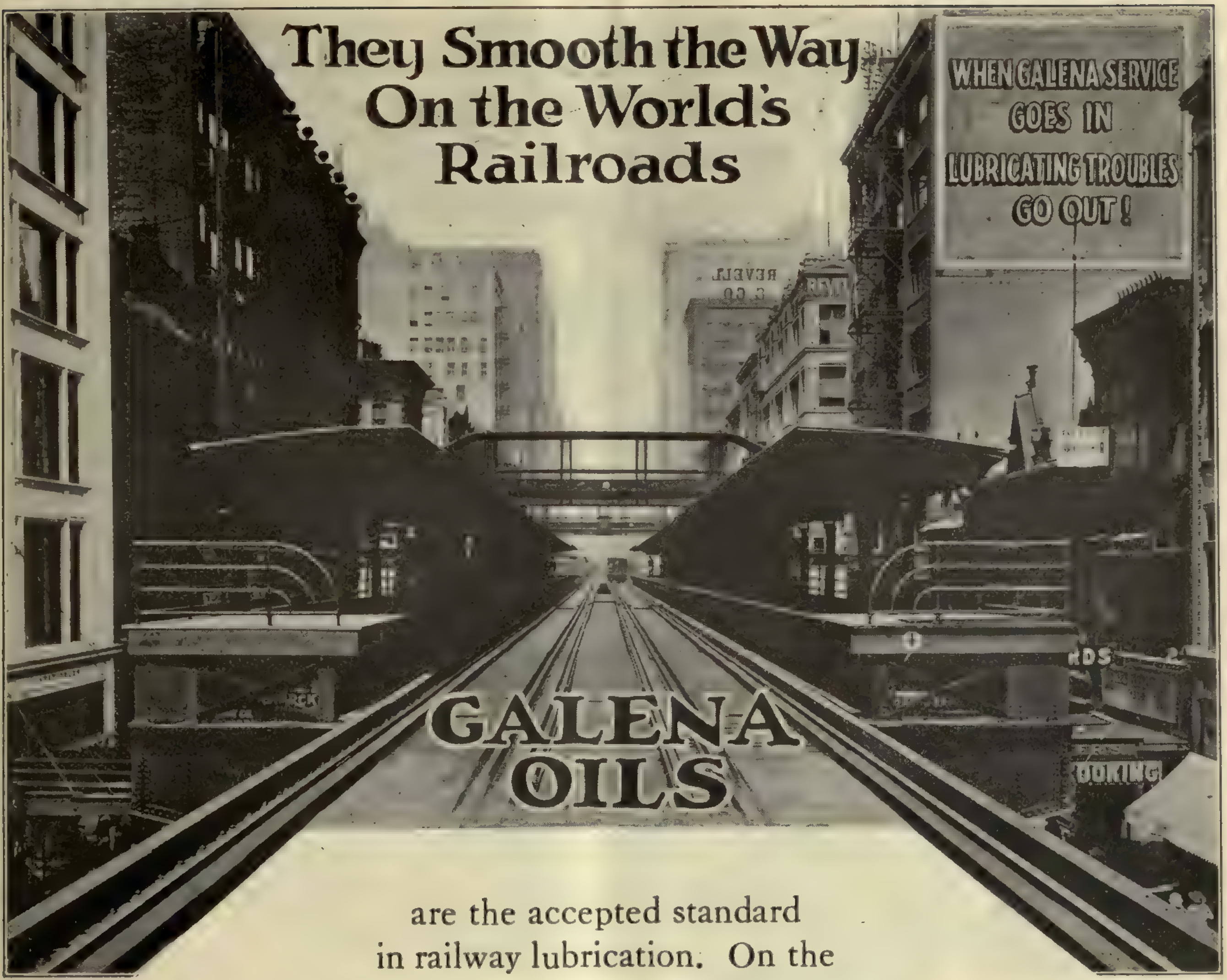
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Is the Engineer Coming Into His Own?

THE engineer is at last a factor in politics. The two leading presidential candidates have not only condescended to reply to a questionnaire submitted by a group of engineers but have also violated their own stated rules in so doing. To all but the engineers, questionnaires to candidates are taboo.

We rejoice that, at last, the engineer is a weight on the political scales. The engineer has been broadened and cultivated by the civic duties thrust upon him by the war, and may peace only enhance his civic and political influence. We need trained men, men with analytical minds, in the nation's politics, so "all hail" to the new era in American politics presaged by the questionnaire.

Standardization of Branch-Off Frogs Means Economy

WE HAVE commented more than once upon the advantages to be gained through the adoption of a standard system of track spirals. The committee on way matters presented the basis of such a system at the Atlantic City convention last year, and the discussion on the floor seemed most favorable to the proposition. The present committee has been charged with the completion of the subject and it is very probable that a uniform system of spirals will be recommended in its forthcoming report.

If this should be the case and the report should be approved the way will be paved for the prompt consideration of the co-related subject of standardization of branch-off frogs, which a uniform system of spirals would make possible. Some railway companies have already done this for their own systems and have found the scheme not only workable but also economical.

With a single system of spirals available, the matter may be approached with confidence in an attempt to standardize branch-off frogs generally. However, this cannot be done until an agreement can be reached in the standardization of double-track center distances through the special trackwork layouts. Even with a uniform spiral having a limited number of radii and with the rather large number of varying track center distances now prevailing it is possible to have more than 5,000 different branch-off frogs. A reduction in this number of frogs is dependent upon the reduction of the number of variable center distances, and it is believed that these can be reduced one-half without causing any serious trouble. Such records as we have seen indicate that these distances might be reduced to ten fixed standards without requiring any company to vary its standards more than 2 in., while in the majority of cases the variation would not be more than ½ in. Such small variations could hardly be objected to either by the railway companies or by the municipal engineers, particularly in view of the fact that the variations from tangent track center distance standards need only be made through the special trackwork layouts.

Further study shows that it would be possible to reduce the 5,000 or more branch-off frogs to less than 80 per cent of that number through limiting the number of variable track center distances. Such a prospective saving is worth trying for and we hope that the Engineering Association can see its way clear to give the subject the attention which it seems to merit.

Illumination—A Power Plant Aid

IN THESE days of operating economies every agent for reducing costs is welcomed and few realize the importance of good lighting as an aid to efficient operation. We pointed out in our editorial of April 17 the fact that it takes time for a man to visualize an object and that good illumination enables a workman to do more work in a given time in car shops. Good illumination now means 10 or 12 foot-candles and not 2 or 3 in order to speed up production.

The power house of a railway company also affords an opportunity for the application of good illumination. New power houses are designed to afford ample light in the firing aisle and other parts of the boiler room, but the older plants require extreme care in movement, even in daylight, because of inadequate lighting. The old dirty, dark boiler room can never be made to operate efficiently by simply adding stokers, meters and draft and other regulating devices. Efficient operation requires every instant that intelligent attention be given to the devices added to aid power production, and unless proper illumination is afforded this attention will not be obtained. In order to see instruments and control levers and to produce the proper psychological and physiological condition in power plant operators good illumination is necessary.

The old boiler rooms should no longer be dirty and inefficient if costs are to be kept down, and illumination is one of the cheapest auxiliaries available to aid in maintaining operating efficiency. The indirect benefits will more than offset the cost of the required system and power plant operators will find it profitable to study their plants with the object of redesigning the illumination system to obtain better results.

The Brooklyn Strike Is Petering Out

ACCORDING to all the evidence so far, the strike on the Brooklyn Rapid Transit System was brought about by the radical element to obtain control over a large industrial organization in that city and one essential to its business and civic progress. The triumph of such an effort would mean the domination of the operation of the system by the same element which caused the strike, accompanied by an enormous increase in operating expenses. This, in turn, would have been reflected in greatly increased fares or correspondingly reduced service.

Fortunately for Brooklyn, the radicals seem to have over-reached themselves. The large body of employees are realizing that they have been forced by a trick into a strike which they did not want, and they are rapidly becoming still further disgusted by the sporadic attacks on trains and cars and other extremes in which the violent element among the strikers is indulging. The return of the men to common sense, to which indications point as this paper goes to press, is a subject of congratulation to the management, the public and the employees themselves. Wages cannot go on increasing in the railway industry and in other industries without still further adding to the high cost of living and perpetuating the vicious circle of continually higher prices which benefit nobody.

This statement of the Brooklyn strike would not be complete without a word of commendation for the police of Greater New York. While not taking sides, they seem to have been promptly on the spot when injury to life or property was threatened and showed energy and courage in repressing disorder.

Lawyers' Strategy in Iowa?

A RECENT decision of the Iowa Supreme Court set aside the right of municipalities to contract with street railway companies as to the rate of fare. On a liberal interpretation of this decision several companies promptly announced that on their own authority a higher rate of fare would be installed. Apparently these companies expect by this procedure to throw the burden of proof upon the municipal authorities if the latter choose to oppose the action of the company by appeal to the courts. The railway companies are setting up a rate of fare which in their own opinion is not unreasonable and which will meet adequately operating and maintenance costs, interest charges and a rate of return on the investment that will attract new money. From a lawyer's standpoint they have placed themselves in a strategic position.

Perhaps Iowa companies cannot be blamed for "taking the bull by the horns" after the starvation treatment most of them have received at the hands of the city authorities, who have heretofore held control. The companies are now apparently acting within their legal rights, but it seems to us that, from the standpoint of public policy, their action is fraught with dangerous possibilities. Going completely over the heads of local authorities and in absolute disregard of one of the terms of a franchise made in good faith, though it seems in bad law, is very likely to invite antagonism and to embitter the people against the corporation for what is sure to be termed its high-handed methods. It seems to us that the same end could have been accomplished, though of course not so readily, by appealing to local authorities to grant a reasonable increase in fare, which they would then be practically bound to do in the face of the Supreme Court decision. This would show that the company wanted to keep faith with the municipality so long as the latter would act within reason. The company could then reserve its action of increasing fares on its own account as a last resort when local authorities had refused to acquiesce in an adjustment that was equitable.

But even if the present action of the companies is justifiable, who is to be the judge as to what is not an unreasonable fare? We doubt that it was the intent of the Supreme Court to lay wide open to the initiative of the street railway companies the setting up of the rate of fare. And while the decision neither sanctions nor prohibits such free action of the corporations, it seems to us that the latter are likely to have prejudiced their case by so doing when the matter comes up for further court ruling, as it surely will.

Transit Anaemia at Bridgeport

WHEN an experienced practitioner is examining a patient for anæmia he will not permit himself to be deceived by such indications as fleshiness. He proceeds to a blood test. In the case of a transportation system that blood test is the amount of business done at the downtown shopping center, assuming that there has been a change only in the method of transportation and not in the industrial or weather conditions. Paradoxically enough, what goes on during the ordinary peak hours is less indicative, because the traffic during those hours is compulsory traffic. People must get to and from their work somehow or other, whether they walk, are bumped along on motor trucks or squeezed into a dirty, odoriferous conveyance. But the mid-day shopper is largely a voluntary rider. She can do part of her purchasing at the neighborhood shop, use the telephone for other items or put off some—and these the biggest—purchases for weeks if need be. Then, too, there is the mail order house, but that is more remote as a factor because the mail order habit is not built up quite so readily in a large city with good stores.

What, then, does the blood test disclose at Bridgeport after six to seven weeks of all-jitney, no-railway operation? That the business men of the city are simply frantic at losses in revenue equivalent to 25 to 50 per cent of their usual summer-day earnings; they want the cars back at any price, realizing as never before that there is a great difference between even tolerable trolley service which is clean and dependable and individualistic jitney bus operation which offers no attraction to the very people who do most of the family buying. Possibly the merchants would have brought their influence to bear earlier were it not for the fact that when both services were available at least half of the riders chose the jitney. The merchants did not appreciate the fact that a great many of the finer class of women would not ride in these nondescript vehicles under any consideration and that these women feel the same way regarding the use of such vehicles by their children. It may be said, however, that if the store owners needed a lesson as to the difference between a responsible company and hundreds of come-and-go jitney drivers, they have paid an exorbitant price for it by this time.

But to come back to our figure of speech as regards anæmia. It is not merely the ragamuffin character of the service that has been injuring the business and social life of car-less Bridgeport. It is the gradual degradation and thinning out of the transportation service, the circulatory medium of the town. During the first jitney week operators came pouring in from the adjacent communities in the hope of an extraordinary harvest. When these men found that they would have to stick to the 5-cent fare instead of profiteering—*á la* Toledo—

they, in the famous phrase of Mark Twain, "went away from there." It seems, also, that there has been a large increase in the number of operators who run buses during the fat hours and engage in other work during the lean hours. Furthermore, quarrels among the jitney operators themselves have revealed that many are cutting back, thus leaving the people at the outer ends of the routes with little or no service. Hence as the weeks passed the tendency has been for the quality of the city transportation medium to become poorer and poorer.

The merchants were first to recognize this, but the amusement men were next, and then even the realty men, who are always so keen for duplicate methods of transportation so long as the other fellow pays for it. The manufacturers and the general working class public were probably the last to feel the withdrawal of trolley service, for their needs are of the "must" variety. Indeed, although Bridgeport has just now passed a jitney restricting ordinance, it is quite probable that the bulk of the voting population would have been willing to let things run until the discomforts of winter travel were upon them before exerting much pressure on the councilmen. Even with the trolleys returned and the jitneys restricted, the public will not forget that the latter did give one permanent advantage—speed. Therefore, unless the railway is prepared to furnish an equivalent in the way of service, there may be a demand for a recall of the jitneys when their sins are forgotten but their virtues remembered. No electric railway can afford to have so potentially powerful a competitor in the background for use as a club whenever the community sees fit. On the other hand, there are many places where a railway company could well do a little "busing" of its own as a supplementary and auxiliary service. Once the railway itself uses the bus in a community welfare way, that no individual operator could think of doing, the possibility of competitive bus operation is reduced almost to the vanishing point.

"We Can't Write Articles"

RECENTLY one of the executives in a large railway company remarked to a member of our editorial staff with respect to a matter under discussion, "We can't write articles." He was undertaking to explain why he did not feel able to pass on his very valuable experience to other railway men in the form of a technical report. Our representative promptly expressed his disagreement with this conclusion, for he knew very well that this engineer could have prepared a most acceptable and effective article on the matter under consideration.

This little incident would not be worthy of record here if it were not an instance altogether too frequently typical of the experience of our staff. It is a variety of stage fright from which railway engineers and executives suffer and against which they should fight.

We do not believe that the average engineer will compose a technical article with the poetic beauty of a Shakespeare or a Milton, nor do we hope for the elegance and the formality of style of Ruskin. Thank goodness we do not get such a result; it would not be acceptable to a technical paper as regular diet even if it were available. We do get straightforward statements and plain readable English that says something valuable to our readers. The same style which a man uses in his every-day business correspondence serves admirably for a technical article. It "puts across" his idea in the most effective way.

In this connection it should be emphasized that the technical man who has achieved satisfactory results by novel means or developed a new device has a certain duty to the industry as a whole. He owes it to his fellow workers in the railway field to share with them his achievement just as they, through technical literature, continually share their advances with the industry. No one likes to be a slacker in such a common cause and it is, therefore, important to get rid of this feeling that you cannot write, for any man who writes an effective business letter can write a good technical article as well.

Fun? Yes, but Not at the Expense of Serious Discussion

THERE was a time when the national conventions of street railway men were junkets more than anything else. These undoubtedly served a useful purpose in getting and keeping traction men acquainted. The operating problems in the early days were simple; there was not much necessity for going into detail. They were rather individual problems anyway; at least they were so considered.

Now we have in the annual convention of the American Electric Railway Association and its satellites a highly organized mechanism which requires the concentrated attention of railway men and manufacturers if it is to function properly. Each year there is more reason why the delegates should be carefully selected and charged with a reasonable weight of responsibility to make the time and expense account investment a profitable one. A compelling reason now is that the convention has become a school where the latest in intelligent railway management is taught. It constitutes, in fact, a short (very short) fall course in that vital subject, with general lectures for all, and more specific discussions for the specialists. The degree given at the end of the course is B. N. I. (Bachelor of New Ideas). If any attendant goes home without his degree he may be considered as having failed, or "busted," as they say in some schools.

Another thing this year is the increase in transportation rates. It will cost more to get to Atlantic City, and hence increased value must be extracted from the sessions.

At the same time we would not minimize the importance of the entertainment features of the convention, which should be a complement and not a detriment to the meetings. At our conventions, however, as at others which might be mentioned, the ratio of attendance at the sessions to the total registration is not what it might be; in other words, the "convention operating ratio" is low. That this fact is appreciated by many is illustrated by the informal talk at a recent committee meeting attended by men who themselves thoroughly enjoy the "good time" features of the conventions. They agreed that one of the best ways to attract and hold membership is to prove by performance that the meetings are held primarily for the good of the electric railways and not for the personal entertainment of the lucky ones who are delegated by the company members to represent them. Let each attendant this year resolve to carry back from the convention as many new and helpful ideas as possible.

This Is Number Seven of a Series of Articles on Salient Phases of the Electric Railway Situation

California and Her Tractions—Part II

By Edward Hungerford

MR. HUNGERFORD found an optimistic spirit among the railway men in California—a feeling that the electric railways have seen their hardest days. Traffic is increasing and automobile competition shows signs of diminishing. Interesting comment is made on the electric roads in southern California and in the Oakland district.

That the traction systems of California have seen their hardest days is the firm belief of Paul Shoup, president of the Pacific Electric Railway, the largest single system in the country, and vice-president of the Southern Pacific Company. Mr. Shoup backs up this statement by figures. He is further substantiated by William Von Phul, president of the United Railroads of San Francisco, who said to me that in the past year the revenues of the property which he heads had been increased by $1,118,000. Unfortunately, increases in both operating cost and taxes had gone ahead a little more than proportionately, about $1,200,000 for the twelvemonth. So in the long run the company had nothing whatsoever to show for its greatly increased business.

Similar reports were made by the officers of the Municipal Railroad. The California Street Cable Railroad undoubtedly would have reported likewise. Yet whence was this flood of traffic coming? On the surface of things, at least, San Francisco was enjoying no great business boom. Automobile kings were not setting up great factories by the dozens—as in Flint or Detroit or St. Louis. Nevertheless, a more careful examination of the situation there at the Golden Gate did show a large resumption of building activities, many of which had been deferred until after the conclusion of the war. While the gradual cessation of the local popularity of the jitneys was unquestionably another real factor in the increased street railroad earnings.

From Los Angeles too came similar reports; both from the local street railway system and from the big Pacific Electric, which has its head and front in that thriving city. In six months to April first the earnings of the Pacific Electric have increased to $6,378,907 from $5,343,063; incidentally, once again its expenses to $4,956,486.76. The Los Angeles Railway makes a like showing. Then it was that I asked Mr. Shoup, as the person best informed on the entire traction situation in California, for the real translation of these figures.

"They mean that the peak of the competition of the automobile,

This is a typical view in downtown Los Angeles. It shows Broadway taken from the corner of Sixth Street. The well-paved streets and equable climate of southern California encourage the use of all kinds of vehicles, and the view shows horse-drawn vehicles and bicycles as well as automobiles and electric cars.

publicly or privately owned or operated, has been reached out here—and passed," was his reply. "Not only is the rapidly rising cost of cars and tires and gasoline and oil beginning to deter the overenthusiastic motorists, but I think that the novelty of excessive motor riding also is rather wearing off. The hazards of driving on crowded highways are becoming more apparent and parking space in towns and cities more a question of doubt. In addition to our great numbers of motor stage routes in every direction, we now have some 500,000 automobiles in California licensed for pleasure purposes, to which should be added the cars owned and operated by the 100,000 Easterners who come out here every winter. The competitive effect of all these cars has been, and still is, vast indeed. But we already can see in it a declining curve."

I think that I can follow Mr. Shoup perfectly. On a glorious California Sunday in May we drove together out from San Francisco in the Santa Clara Valley toward San José. The excellent highroads were thronged with cars. Yet driving that day was not without its perplexities. Not only was gasoline very high priced—for California—but there was precious little to be obtained at any price. One drove from service station to service station, and occasionally when he was known or favored was grudgingly doled out two or three gallons of the precious fluid. There was not an ounce of it to be spared. While from the more remote counties of the northern part of the State came tragic reports of "gas" tanks completely emptied; not a drop of it in whole townships even for emergency purposes. The gasoline famine was upon the land; a tragedy which traction men at least were enabled to regard with complete equanimity.

I felt, even myself, that I could perceive a distinct lessening of that traffic upon the highway and the gain upon the steel road. On the preceding afternoon I had ridden from Marysville through to Oakland—140 miles—upon two extremely well-operated interurbans, the Sacramento Northern and the San Francisco-Sacramento, and had found their three-car trains well filled. And at 3 cents a mile. It looked like good business. It *was* good business.

And yet do not under-rate the volume of that motor bus and motor truck and private motor car competition today or tomorrow. Even if our national supply of gasoline runs low and fails utterly to keep pace with our very great national increase of self-propelled vehicles upon our highways, the automobile manufacturers will proceed promptly to develop a substitute fuel. Do not forget that, Mr. Street Railwayman. The highway is bound to be a real competitor of yours for many a year to come. Yet not necessarily a competitor, with everything in its own favor.

PAUL SHOUP

President of the Pacific Electric Railway and vice-president of the Southern Pacific Company, who sees better times ahead for the electric railways of California. Mr. Shoup's views on automobile competition are given by Mr. Hungerford in this article.

IMPROVEMENTS PLANNED AT LOS ANGELES

It is another phase of this very press of competitive traffic, however, that has led Mr. Street Railwayman Shoup, who harbors no delusions as to the strength of his automobile adversaries, to look forward toward the eradication of many of the grade lines and grade crossings that have slowed up the operation of his Pacific Electric lines. From the beginning these lines have been well built—the important main stems to Long Beach and to Pasadena being entirely on private rights-of-way from the points where they leave the Los Angeles streets, just outside of the heart of that thriving city. It is this interior radius, however—between the private rights-of-way and the P. E.'s great main station at Sixth and Main Streets—that the troublesome delays occur. It matters not that all the way from the Los Angeles River, near the old business center, up to South Pasadena, 6 miles, there is not a single grade crossing—except one, little used now—and so no interruption whatsoever from the heavy automobile traffic of Southern California. It is the eight or ten blocks of congested Main, San Pedro and Aliso Streets, Los Angeles, through which every one of the two hundred cars or more that run between that city and Pasadena pass, that slows so greatly the passage of the great red interurbans.

So Shoup has planned to eliminate these delays, not only to the Pasadena and San Bernardino cars but also to those running to Long Beach and other ocean-shore communities to the south and west of Los Angeles. With typical thoroughness and energy he has planned an elevated structure leading out from the great terminal station of the Pacific Electric there at Sixth and Main Streets and, a short distance from there, branching to the north and to the south until it reaches these same private rights-of-way of which we were just speaking. There would be some 2½ miles of this structure all told, and it would carry all the way from two to four tracks. Moreover, as now planned it would pass and have physical connection with the new Arcade Station of the Southern Pacific lines in Los Angeles and the sole interchange point of their vast traffic through that city.

Nor is this all: The plan provides that a part of the connection of the proposed elevated railway to the Pasadena main stem of the Pacific Electric shall pass over and upon a portion of the right-of-way of the Los Angeles & Salt Lake Railroad. By adopting the construction plans in the right fashion it then would be easily possible for the Salt Lake route to abandon its present badly located and somewhat temporary passenger terminal in Los Angeles and by a line adjoining the Pacific Electric's new elevated lines bring its trains right into the Southern Pacific's commodious Arcade Station, which tracks in turn will take all Southern Pacific trains off Alameda Street, a busy thoroughfare through the city, which it has used for some forty years or more. In a similar fashion the Santa Fé might also abandon its own present depot and so help to achieve that pet dream of some of the Angelenos, a real union station for all their railroads.

But whether these last steps are ever accomplished or not, the fact remains that by the simple device of tapping the Arcade Station, with its projected elevated line, the Pacific Electric could and would be of great help to a large percentage of the tourists who annually visit Southern California, to say nothing of the great volume of the steady all-the-year traffic. Already it has been a real factor in the upbuilding of those two great suburban cities just outside of Los Angeles: Pasadena, with 45,000 population today, and Long Beach, with 55,000. A goodly proportion of the steam railroad travel bound in and out of Los Angeles is destined to or from these two communities. Some years ago the Southern Pacific folk saw the wisdom in abandoning for passenger service their 12-mile branch up to Pasadena and letting the Pacific Electric collect and distribute this form of traffic. The new plan as suggested will render such interchange far easier. And a scheme will soon be effected which will transform the present comfortable Southern Pacific station in Maryland Avenue, Pasadena, into a complete terminal for Pacific Electric cars and so relieve in turn the streets of that rapidly growing suburb, which themselves some time ago began to reflect in no small degree the increase in automobile traffic and congestion.

Here then is quickly established that correlation between the long-distance and the short-distance electric train or car that broadminded and far-seeing students of transportation conditions in the United States have long desired to see come into effect. In far too many cases have there been differences or misunderstandings or long-existent feuds to delay such sane and logical progress. At Pasadena there is neither. Simply a sensible understanding of the fact that with the new elevated completed, as well as the transformation of its Southern Pacific terminal, the trip from its heart into the heart of Los Angeles can be made in from twenty-five to twenty-seven minutes. It now takes from thirty-five to forty. While to the Pasadenian bound for the north—let us say to San Francisco—the time saving is far greater. His trolley car will drop him direct at the Southern Pacific's new station, saving him both the time and expense of transfer.

HIGHER FARES ARE NEEDED

With so simple a relief plan all worked out one wonders why it has not long since been put into effect. The answer is simple: The improvement work as at present laid out by the engineers is far from a cheap job; their estimates for it run all the way from $2,000,000 to $5,000,000. One speaks quite easily in millions these days, yet one does not obtain those selfsame millions quite so easily. Particularly when one is engaged in conducting a property whose operating costs have climbed from 30 to 40 per cent since 1914, and whose wage-rolls alone—for from 4,500 to 5,000 people—have gone up 78 per cent just since 1916. Cross-ties today cost just twice what they cost five years ago, while rail is up from $28 or $30 a ton to $47—at the rolling mills. At the Pacific Electric's receiving station transportation across the continent brings this figure close to $70. At this writing I am advised that the money has been found and only the consents of the State Railroad Commission and Los Angeles city are necessary.

Against these great increases in cost, increases in fare have as yet been but slight. Local fares in Los Angeles still stand at 5 cents. Yet that city, like San Francisco, will in all probability be forced to face the necessity of at least a 6-cent fare. Six-cent fares already have begun to creep into California, which, seemingly, has been far slower to feel increased living costs than most of her sister states in the East. Oakland, San José, Fresno and Stockton already have them, with Sacramento soon to follow, while in San Diego local fares, with the exception of a limited zone in the heart of the city where a 5-cent fare still prevails, have been placed at 7½ cents, with a slight reduction when tickets are purchased in quantities.

The Pacific Electric's fare increases have been correspondingly slight. The flat round-trip fare of 50 cents which formerly prevailed from Los Angeles to any of the seashore communities roundabout here from Long Beach to Santa Monica—the one-way distance varying from 15 to 25 miles—has been increased to but 60 cents; the one-way fare from 35 to 40. Sixty cents for 30 to 50 miles seems cheap enough. In the minds of the Pacific Electric folk it is far too cheap. They feel that their standard long-distance rate of 3 cents a mile, based upon the practice of their steam railroad competitors, is none too high.

It is not to be denied that the motor bus competitors also are a large factor in the regulation of single-trip fares in some directions and possibly round-trip fares. Shoup himself would be the last to deny such a factor. He has a way of taking direct hold of questions such as these. It is fairly characteristic of him.

"Yet I cannot but believe," he says, "that these motor buses are now bound to come more and more under public control. They are going to be taxed, fairly but certainly. They are going to have to pay their fair share for the renewal and maintenance of the very pavements for which the street railway companies paid in the beginning, and the tax is going to be based in some way in proportion to the weight of the vehicle and the consequent destruction that it does to the pavement. All of which means of course competition on terms nearer equality. And which, combined with the steady increase in cost of operating a gasoline-vehicle of any sort, is already beginning to give us a fairer chance in California. As I said at the beginning we have, in my opinion, reached the peak of the situation and are already come to a slightly easier point."

RAPID TRANSIT LINE IN OAKLAND ALSO

In Part I of this article I spoke of the peculiar problems and perplexities confronting the street railways in San Francisco today. I omitted taking cognizance of the two rival systems in the three large communities on the far side of San Francisco Bay until after I had mentioned the head of the Southern Pacific electric properties. For, remember, if you will, that all of Shoup's activities are not concerned with the huge Pacific Electric property, although that is of itself a man-sized job, with its more than 1,000 miles of track and its 2,000 cars. He also operates the Fresno, Stockton and San José local systems, which are S. P. properties, as well as the Peninsular Railway, connecting the last of these systems with Los Gatos and Palo Alto, and the Visalia Electric Railway—some 200 miles of track in all. The direct suburban lines of the Southern Pacific up at Portland and at Oakland, Berkeley branch and one or two edge of San Francisco Bay are electrified. This last is a really remarkable system, built up of the Berkeley branch and one or two other small feeders of the parent Southern Pacific system. From these, and some other brand-new routes, was built up a suburban system, operated by overhead pantagraph trolley and in and out of the main Southern Pacific ferry terminal at Oakland Mole as well as a secondary ferry terminal on Alameda Mole. Its trains of bright cherry-colored steel coaches, each seating 120 passengers, are absolute models in electric traction. They long have been the admiration of trolleymen from afar when they come to the Golden Gate.

Yet even this is an unprofitable system. That it was overbuilded even the Southern Pacific people would probably be willing to concede today. That it could last thirty days without the strength and support of the parent system no one is willing to admit. In some earlier paragraphs I called attention to the hotly competitive conditions in San Francisco and the excellent service that ensued as a result and said that here was a regular argument for the man who says that transportation efficiency may only come under conditions of real competition.

Oakland and Berkeley are quite as competitive in their street railway service as is San Francisco. While the Southern Pacific was transforming and expanding its suburban lines at the east side of the bay, a shrewd resident of the first of these towns had purchased its local street railway system and was preparing to develop it into a real rapid transit system that would also serve Berkeley. The man had plenty of that thing we Americans like to call vision, plenty of capital, too, and out of it all was evolved the so-called Key Route, whose bright new yellow cars were hooked together in trains and were quite the pride of the communities which they served. They ran out to a brand-new ferry terminal or "mole" and from it a fleet of ferryboats ran to and from the great union ferry house in San Francisco.

The yellow cars are not so bright as they were in those days. The Key Route has fallen into days of adversity. If it were not for the ownership of the Oakland local street railway lines its days would be even harder than they already are. True it is that it has had some slight revenue relief in the fact that it shared with the Southern Pacific's electric lines the recent general increase in the flat fares from San Francisco to Oakland, Berkeley or Alameda from 10 cents to 15, and engages in some slight advantage over its big steam competitor in the fact that the Southern Pacific is forced to pay even its electric train operators the steam train wages, a schedule considerably higher than that of the average traction company. But even these advantages do not seem enough to spell a permanent opportunity for the Key Route.

The suburbs of Los Angeles are noted for their large number of handsome residences, well-kept lawns and attractive surroundings. This view, with its palms, is characteristic.

CONSOLIDATION IN OAKLAND AND BERKELEY DESIRABLE

The eventual solution of its pressing problems, like that of the competing street railways of San Francisco, seems to be consolidation. There are suburban electric lines of the Southern Pacific in the Oakland district that could and, in all probability, eventually will be abandoned and pulled up. There are lines of the Key Route too that in the event of consolidation would become equally superfluous and would suffer a like fate. And in all probability the ferry house and "mole" would disappear—as far as the Key Route is concerned at any rate. It has been suggested as a likely terminal for the Southern Pacific's long-distance competitors into San Francisco—the Santa Fé and the interurban systems to Stockton, to Sacramento and the north. But whether this last step be ever taken or not, I think that I shall not have to live many years to see the day when the rapid transit services at the east side of San Francisco Bay shall be permanently and securely merged.

Such a day cannot, in my opinion, come too quickly. To one who has preached, and he hopes consistently, transportation efficiency gained by consolidation and correlation, there are plenty of texts in the metropolitan district of San Francisco. We have just seen how good planning and good old common sense may effect such efficient correlation in Los Angeles. The opportunities in the great communities to the north are quite as great, if indeed not greater. The economies which they may accomplish are not alone those of money, not merely benefits to the companies which establish them. They are to be written in the service to each of the 35,000 commuters who cross daily from Oakland ferry houses to San Francisco and cross back again at night. They are economies at wholesale. And so almost bound to accomplish wholesale results.

A Model Traffic Ordinance Considered

Tentative Ordinance Presented for Discussion—Rigid Specifications on Right of Way, Speed Control and Parking—Discussion by National Traffic Officers' Association

THE third annual convention of the National Traffic Officers' Association was held in San Francisco, August 23-27. The convention devoted its efforts toward perfecting a motor vehicle act which would be uniform for all states and discussed a tentative model traffic ordinance presented under the auspices of the A. E. R. T. & T. A.

The convention was addressed by Mayor Rolfe of San Francisco and by Governor Stephens of California on Monday, after which the president of the association, Daniel A. Sylvester, gave his annual address. On Tuesday the morning was devoted to committee hearings and the open session in the afternoon was taken up with six addresses on various aspects of traffic regulation. W. H. Maltbie, general counsel of the United Railways & Electric Company of Baltimore, talked on "Traffic Regulations from the Standpoint of Electric Railways." Another open session was held Wednesday afternoon, at which technical traffic and vehicle problems were discussed by several automobile representatives. On Friday morning a proposed "International Vehicle Law" was presented at an open session by E. W. Braun. The association desires uniformity in state and city traffic regulations and the proposed law covered all phases of transportation. The morning sessions were taken up with committee discussions.

The electric railways committee spent a great deal of time in discussing a proposed "Model Traffic Ordinance," presented by its chairman, W. H. Maltbie. Mr. Maltbie served on the committee on code of traffic principles of the American Electric Railway Transportation & Traffic Association.

ABSTRACT OF PROPOSED ORDINANCE

Section 1 of the proposed ordinance deals with definitions and departs from the conventional ordinance in defining only two terms. "Main Thoroughfare" is defined as "any street or part of a street upon which street cars are operated and also any street or part of a street so signed." "Delivery District" is defined as "the area of traffic congestion officially designated as such." The ordinance also calls every traffic agency a vehicle except a street car.

The ordinance is unique in that Section 2 specifies no definite speed limit, but simply states "Every driver shall keep his vehicle under such control as will enable him, by the exercise of ordinary care and diligence, to avoid collision or other interference with other vehicles or pedestrians who are proceeding in accordance with traffic regulations."

In the event of accidents the ordinance specifies that a presumption of negligence shall lie upon the vehicle violating traffic rules, and as between a vehicle or street car proceeding under a traffic officer's direction and a pedestrian, upon the pedestrian.

The section specifies right-hand curb stops in all two-way streets and states that no vehicle shall cross a foot way at any point other than a street or alley crossing without coming to a full stop. The usual signal and lighting rules are specified and the section prohibits any vehicle passing a stopped or stopping street car, unless the car is at a safety zone, and all vehicles, except on one-way streets, must pass a street car on the right-hand side, but must pass other vehicles on the left-hand side. The police department is given authority to establish safety zones and all vehicles are prohibited from driving through or over any safety zone.

In regard to right of way the section specifies that a "despatched" vehicle (proceeding at the direction of a traffic officer) or street car shall have the right of way, but that subject to the right of way of emergency vehicles and despatched vehicles, the street car shall have the right of way. Traffic on "main thoroughfares" is given the right of way over traffic on other streets, and all drivers of vehicles approaching a "main thoroughfare" must slow down and enter and cross such a thoroughfare at a rate of speed that will permit them to stop their vehicles within their lengths. Unless otherwise specified the "right and left" rule is applied to all traffic.

Section 3 deals with pedestrians and prohibits stepping on or off a moving street car and provides for movement under traffic officer direction at despatched crossings.

No building or heavy object whose movement may obstruct traffic can be moved along or across street railway tracks except under a special permit, is one of the miscellaneous provisions of Section 4.

Section 5 specifies the use of mufflers and prohibits noisy loads, operation with a flat wheel or flat tire or other defects that may interfere with private or public comfort.

The ordinance is unique in dealing with "delivery districts" in that Section 6 states that "the authorities shall have the power to designate, wherever traffic congestion shall in their judgment warrant such designation, certain special areas which shall collectively be known as the "delivery district." This section also gives the proper authorities the power to specify hours as the morning and evening traffic peak hours and defines slow, medium and fast-moving vehicles.

Section 7 deals with general regulations covering deliveries, stopping at curbs, licenses, etc., and Section 8 provides that no parade shall pass through a delivery district without a permit and that no parades may be held during traffic peak hours or block any street car line for longer than five minutes.

Parking provisions are covered by Section 9 and are specific as regards parking in delivery districts, near fire plugs, public buildings, etc. Section 10 covers traffic in one-way streets and Section 11 deals with special regulations in the delivery district. It states that vehicles shall not stop for delivery or loading of goods during peak hours and limits the size of vehicles which may operate in the delivery district.

Section 12 deals with street car regulations and states that cars shall be kept in good operating condition, be equipped with head and tail lights visible at certain unstated distances front and rear, be provided with life guard, fender or other approved protective device and make fixed stops for passengers and such other stops as may be determined. Violation of the ordinance is considered a misdemeanor, but the penalty for conviction is left blank.

The ordinance is well drawn and shows that the committee has studied traffic conditions in detail. The provision regarding main thoroughfares and their crossings should expedite street car schedules, and giving the street car the right of way, other things being equal, should also aid car movement.

W. H. Maltbie in discussing the ordinance pointed out that the present traffic problem grows out of the development of the automobile, which has increased the speed of traffic movement and the number of traffic vehicles, and that the modern office building has increased the concentration of traffic in the delivery districts. He stated that regulation is essential which must provide safety at every point, expedite traffic and afford protection to individual rights to the street, such as the access of property owners to their property, drivers, riders, pedestrians and freight movers to passage through the streets, and all classes of emergency traffic.

The solution of the problem must be a compromise based on give and take, the rights of the few yielding to those of the many and the normal service to the emergency service, but no right must be entirely denied.

Mr. Maltbie continued by saying that traffic conditions differ in the various localities of a city so that district traffic regulations and rules are essential; that conditions vary from hour to hour in the districts so that peak and off-peak rules and regulations must be provided, and finally that the nature of the rules and regulations depend on the character of the traffic, which necessitates a classification of traffic with individual rules and regulations for each class.

ELECTRIC RAILWAYS WELL REPRESENTED

Ten committees were appointed to make recommendations for a model traffic law, each committee to cover its respective field. The railway industry was well represented on the committees, as is indicated by the following list of committees and the names of the railway representatives: Arrests and penalties, J. H. Handlon, general claim agent United Railroads of San Francisco; auto and truck transportation, W. V. Hill, manager California E. R. A.; electric railways, W. H. Maltbie, general counsel United Railways, Baltimore, and W. R. Alberger, vice-president San Francisco-Oakland Terminal Railways and president California E. R. A.; general laws, F. E. Chapin, general manager Peninsular Railway and San Josè Railroads; headlights, E. M. Maggard, general manager Petaluma & Santa Rosa Railway; municipalities, E. L. Lewis, assistant general manager Los Angeles Railway Corporation; organization, W. M. Abbott, chief counsel United Railroads of San Francisco; rules of road, F. W. Webster, general manager Visalia Electric Railroad, Fresno Traction Company, Stockton Electric Railroad and Central California Traction Company; safety first and safety appliances, C. E. Brown, general manager San Francisco, Napa & Calistoga Railway; steam railroads, H. A. Mitchell, general manager San Francisco, Sacramento Railroad.

On the last day of the convention the executive committee of the association decided to put the committee reports in the hands of a special committee which would have time fully to digest the various recommendations and prepare the desired model traffic law in time to submit it to the Dec. 2 meeting of the executive committee. On this committee for framing the law the following men were named: David Farres, Automobile Club of Southern California, Los Angeles, chairman; W. H. Maltbie, counsel for United Railways & Electric Company, Baltimore; Robert W. Martland, secretary California Auto Trades Association, San Francisco, David Von Schaak, National Safety Council, New York; E. W. Braun, Associated Chambers of Commerce, Elgin, Ill.; Percy E. Towne, American Automobile Association, San Francisco; J. B. Monahan, Southern Pacific Railroad, San Francisco; J. E. McCurdy, Peninsula Rapid Transit Company, San Mateo, Cal., and Dr. Clayton H. Sharp, Illuminating Engineering Society, New York.

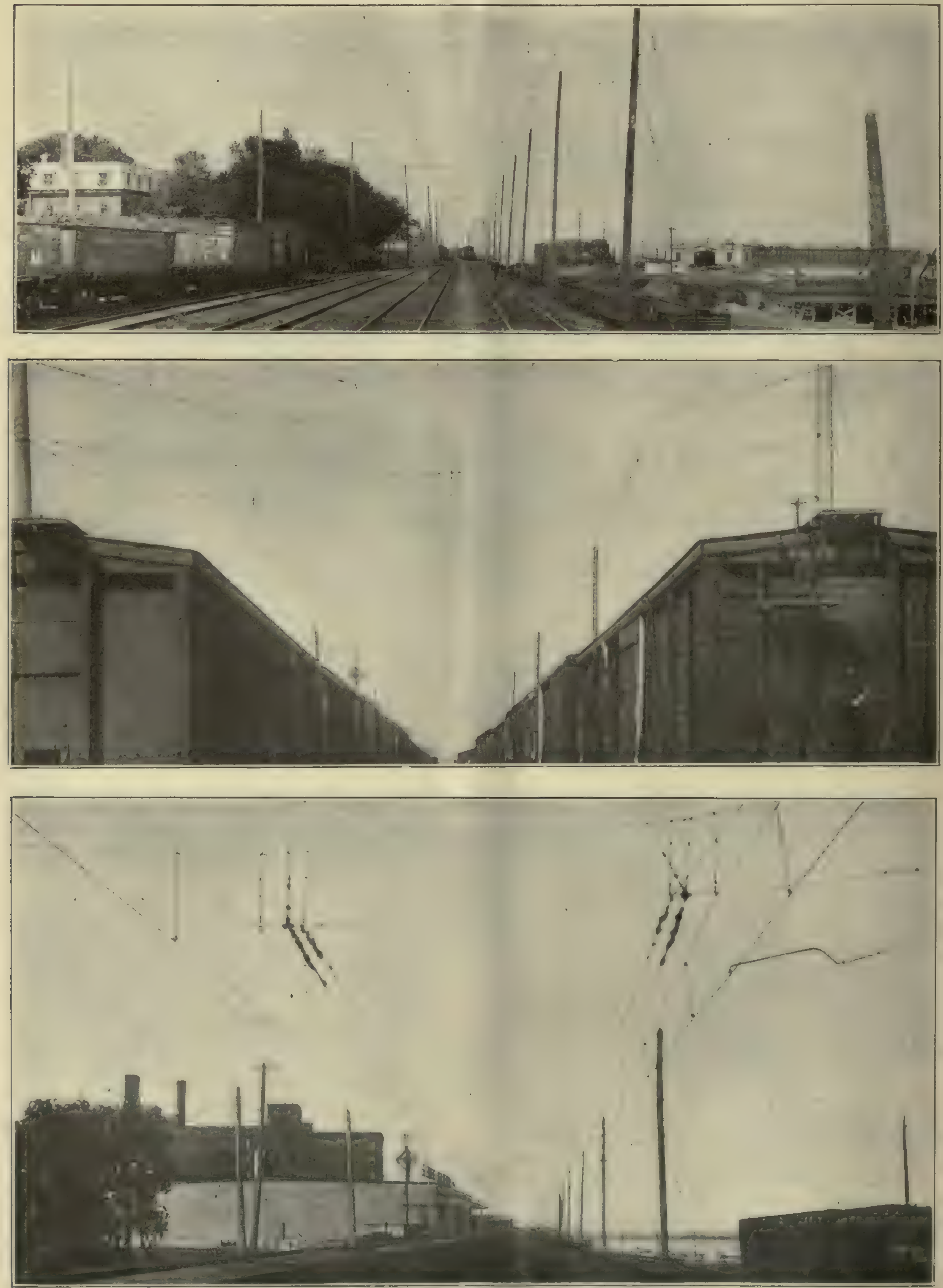
While the recommendations of all the committees are to be considered in framing the proposed model law where they can then be studied as a whole, it may be of interest nevertheless to mention here some of the provisions recommended. The electric railways committee approved specifically many sections of the "model traffic ordinance," which was printed and circulated at the convention by a committee of the American Electric Railway Transportation & Traffic Association. The general laws committee approved the provision that all motor vehicles must come to a full stop before crossing steam or interurban electric railways. The auto truck and transportation committee recommended that motor vehicles for passengers and freight-carrying purposes be considered as common carriers and that their control should be vested in utility commissions of the states in which they operate.

Mr. Maltbie is to write that part of the proposed law that deals with city traffic, while Mr. Farres will write the portion that deals with the highways, after which the committee as a whole will pass on the material presented.

The meetings were held in the San Francisco Municipal Auditorium, where ample space was available for the display of a large number and variety of safety devices under the same roof, with meeting halls of large and small size suitable for the general and committee sessions.

The association voted to change its name to the International Traffic Officers' Association. Lieut. Daniel A. Sylvester of the San Francisco traffic police was reelected president and Chicago was chosen as the next place of meeting, the date to be fixed by the executive committee.

The Illinois Committee on Public Utility Information, 203 South Dearborn Street, Chicago, Ill., has recently issued its Speakers' Bulletin No. III, entitled "Regulation of Public Service Companies." This bulletin is for the purpose of suggesting ideas to speakers who are called upon to express themselves with reference to public utility problems. The present bulletin endeavors to assemble opinions of experts on fundamental questions concerning regulation and furnishes information about law and practice which have drawn around regulatory commissions. It emphasizes the spirit of regulation which governmental bodies are exercising the country over to give fair dealings both to the public and to the public utilities.



THE TOP VIEW SHOWS THE STANDARD OVERHEAD CONSTRUCTION ON TANGENT OF THE MONTREAL HARBOR COMMISSION. THE LOWER VIEWS ILLUSTRATE THE CONSTRUCTION AT CURVES AND SWITCHES

PORTION OF THE UNELECTRIFIED WATERFRONT OF MONTREAL, SHOWING PIERS, TERMINAL RAILWAY, ETC.

Electrification in Montreal

Montreal Harbor Commission Is Installing 2,400 Volts on 58 Miles of Terminal Track—Work Decided on Before War, but Now Being Carried Out

UNDER the direction of the Montreal Harbor Commission, at the head of which is a former electric railway manager, William G. Ross, Montreal harbor has become the second in North and South America and the seventh in the world as to the value of foreign commerce passing through it. The harbor may be considered to extend a distance of about 17 miles on both sides of the St. Lawrence River, and as it is at the head of ocean navigation on the St. Lawrence River and at the foot of inland navigation of the Great Lakes it seems certain to increase in importance still further. The large supply of electric power in the vicinity of Montreal will be an important feature in the development of that port.

It is not, however, with the shipping features of the port that this article will treat, but in regard to the terminal railway, which is now being electrically equipped under the direction of the commission. This railway comprises some 58 miles of track extending along the waterfront and connected with the piers, as well as with the steam railroads which enter Montreal. Regularly during the summer season the shunting on this harbor railway amounts to from 1,000 to 1,800 cars daily.

Decision to electrify this line was made in 1914, after the commission had determined that an electric locomotive could handle at least 25 per cent more traffic than a steam locomotive and that its operation was much more under control, but owing to financial conditions caused by the war construction was deferred. During the summer season of 1918 nine locomotives were in operation, and it was decided that if the service was to be maintained at its highest efficiency additional locomotives would be required. In July, 1919, plans and specifications were issued for the electrical equipment of the lines, and a start was made in September of last year. About half of the overhead lines are now electric.

In view of the climatic conditions and the very successful operation of the Canadian National Railway lines through the Montreal tunnel terminals, which have a 2,400-volt direct current overhead system in use, a similar system was adopted for the Montreal harbor terminal.

OVERHEAD EQUIPMENT

The overhead equipment, which is illustrated in several accompanying views, consists of cross-span catenary construction. The main messenger is a $\frac{7}{16}$-in. extra-galvanized Siemens-Martin steel cable, anchored at half mile sections. The anchor poles are heavily guyed in all directions. The cross-spans are supported by wooden and steel poles at spacings of 150 ft. on tangent double track and 120 ft. or 105 ft., as conditions require, on curves and in yards. The cross-span wire is a $\frac{5}{16}$-in. high-strength galvanized steel cable, the tension on the messenger and span being maintained at approximately 2,300 lb. The working conductor is No. 0000 grooved hard-drawn copper wire, suspended by the loop hangers at a uniform height of 23 ft. above the top of the rail.

Wooden poles are being used where the development is not completed, these being western cedar timber, varying in length from 40 ft. to 65 ft. as conditions demand. The poles are butt treated with hot carbolineum as a preservative. Steel poles are being used when permanent conditions exist, the poles being set in concrete carried well above the ground level. Welded 7-in. No. 0000 bonds are used.

At present two electric locomotives, built originally for the Canadian Northern Railway, are being used to shunt cars on the finished portion of this line. A substation, built for an ultimate capacity of three 1,000-kw. motor-generator sets, is being erected.

Take Your Choice

SENATOR Harding and Governor Cox have replied to a questionnaire presented to them by the American Association of Engineers. Governor Cox gives an unequivocal "yes" as his reply to each of the five questions presented. Senator Harding does not say no to any question and does say yes to some, but reserves his decision on one main "important and far-reaching" question until he has given it "the very fullest study."

The questions submitted were: (1) Do you favor a Department of Public Works, for the purpose of reducing and co-ordinating the present number of bureaus and commissions and reducing the useless expenditure of money incidental thereto? (2) Are you in favor of putting all engineering and construction enterprises (excepting purely military work) in such a department to obtain economy and efficiency? (3) Do you favor an engineer as member of the Interstate Commerce Commission? (4) Do you favor a progressive and constructive program of conservation and development of our natural resources? (5) Do you favor a budget system for appropriating public funds? (6) Do you favor the reclamation of waste lands and giving the settler the advantage of procuring such lands by a sound financial system such as is provided by a rotating fund?

Governor Cox replied:

"My reply to every one of the questions you ask is unequivocally 'Yes.'"

Senator Harding replied:

"I have had up the matter of the Department of Public Works. . . . I fear I should be unworthy of public confidence if I ventured to decide so important and far reaching a question without the very fullest study. It involves the reorganization of several departments. Undoubtedly, there is necessity for this, but I should be very reluctant to commit myself unalterably to it without the very fullest of understanding. . . . I have already sent for the congressional hearings on the particular question.

"I may say, in a general way, that I think very well of the appointment of an engineer on the Interstate Commerce Commission and I have always spoken heartily in favor of a progressive and constructive program of conservation. I am sure you know I favor the budget system and a very forward policy relating to reclamation and irrigation."

Appeal to Encourage Research

ENGINEERING FOUNDATION, administered under the auspices of United Engineering Society and the four "founder societies," A. S. C. E., A. I. M. & M. E., A. S. M. E. and A. I. E. E., is supported only by voluntary endowment and now finds itself in need of approximately $500,000 additional endowment immediately, to add to the present $300,000 and the assured $250,000 more. It appeals, in a bulletin issued Aug. 23 from its headquarters, 29 West Thirty-ninth Street, New York, to the engineering profession and industries based on engineering for the necessary endowment.

Engineering Foundation is organized to support researches in engineering and to aid in applying the results to engineering industries. It exists largely on account of the need of research, other than that carried on by the Government and large corporations, beyond the means of industrial engineers, small companies and separate societies. Its method of operation is to support researches by individuals and organizations and to co-operate with, but not duplicate the work of, other research organizations which now exist and operate in limited or restricted fields. It also purposes eventually to establish a research institute and laboratory, the latter probably partly self-sustaining.

The bulletin records the past history and accomplishments of Engineering Foundation and indicates its usefulness to the industries dependent upon engineering and applied science. It shows the need of the foundation and the reasons why engineering industries should make an effort to add to its endowment.

San Francisco Rail Jointing Methods

IN THE last ten years the United Railroads of San Francisco has made more than 11,000 rail joints on the tracks of its system, and although joints laid previous to 1910 have given some trouble, to date there have been no cases of loosening or cupping in track laid since the present installation methods were adopted. No welded joints have been put in and with the present record for joints that stand up under long service engineers of the company do not consider that welding is necessary under conditions in San Francisco.

The policy followed is to allow rail joining to be done by only one crew and to keep the work of this crew up to a very strict high standard. This crew, which also does the bonding, consists of one foreman and two to four men. Two additional men are required for operating the planer when that is required. The crew is kept as nearly intact as labor conditions permit.

When a rail joint is to be made the track laying gang leaves it after simply putting the plates in place with two bolts to hold them together. When the bonding crew comes along the plates are removed and a very careful job of fitting and finishing all parts of the joint is done. The secret of the company's success with rail joints is believed to be a tight fit all around. Inspectors make sure that this is secured even if the crew has to come back to the joint several times; in fact, this is not an unusual occurrence.

An important part of the work is the filing off of the rail heads until both are exactly on the same level. This is done with a vixen file held in a two-man machine. The file is worked back and forth along the joint until both rail heads show bright for their full widths. The theory is that if the rail heads are exactly level and if the joint is tight cupping cannot occur. It has sometimes been noted that a rail joint on which no difference of level can be seen or felt with the fingers, nevertheless will, when the file is put on it, show that there is a slight difference in elevation. This is at once apparent after a few strokes of the file, as low places will not show bright. The elimination of this slight difference is believed to prevent the beginning of the destruction of the joint by preventing "cupping" from starting.

All the joints referred to above are on 106-lb. rail and use bridge type, twelve-bolt hole, Loraine Steel Company plates. The custom is to buy plates and rails at the same time and to specify that the plates shall be of the same metal and of the same hardness as the rails. The engineers of this company believe that plates made of material softer than the rail itself are less likely to keep the joint permanently tight.

Electrification of the Prussian Railways in Silesia*

Single-Phase Power with 15,000 Volts on the Contact Line Is Used—Interconnected Water Power Plants with Steam Auxiliary Furnish Power—Several Types of Locomotive Are Required to Cover All Classes of Requirements

THE railroads of the Silesian mountains extend along the frontier of Bohemia between Görlitz and Glatz, as indicated in Fig. 1. They serve several industrial districts, of which Waldenberg is the most important. There is a very important traffic of both passengers and merchandise, especially coal, the development of which should be facilitated by the electrification of the railway lines.

This electrification was authorized by a law dated June 30, 1911. It is intended to include all the lines of the district of Breslau. In order to minimize the expense of installation and to profit from existing facilities, power will be purchased from a private company founded by the Allegemeine-Elektricitäts-Gesellschaft and the Siemens-Schuckert-Werke, which have undertaken the construction of the central stations and the high-tension transmission lines joining them, the administration of the system retaining to itself the title to the equipment of the lines. The company obligates itself to deliver 40,000,000 kw.-hr. per year at a price of 2.75 pfennigs, with a rebate of 1 pfennig per kilowatt-hour not used. The maintenance of the high-tension line and substations devolves upon the railroads.

Fig. 2 gives a simplified profile of the principal line, which extends from Lauban to Königszelt. Heavy grades are encountered, and the train weights are up to 550 net tons for the expresses and 1,300 tons for the freight trains. With steam operation the use of two very heavy locomotives for each five cars was necessary. Aside from this the proximity of important hydraulic power permitted with electrification a large saving in coal. Hydraulic stations are located at Mauer with 5,500 kw., Marklissa with 2,600 kw. and Weistritz with 1,300 kw.

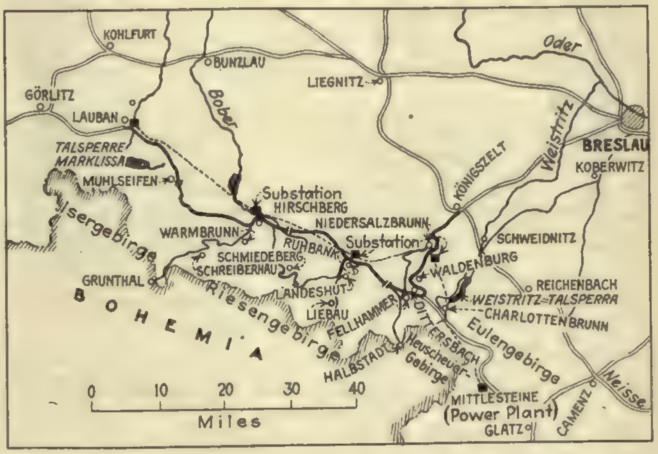


FIG. 1. MAP OF SILESIAN MOUNTAIN ELECTRIFICATION

The complete system includes the following lines: Double-track line from Lauban to Königszelt, 80 miles; single-track line from Nieder-Salzbrünn to Halbstadt, 21.8 miles; double-track line from Ruhbank to Landeshut, 3.7 miles, with branch line from Landeshut to Liebau, 16.8 miles; line from Hirschberg to Warmbrünn, Schreiberhau and Grünthal, 33 miles; line from Hirschberg to Schmiedeberg and Landeshut, 25 miles. These total a route mileage of 170, comprising 310 miles of single track. All of the other lines have profiles similar to that of the principal line. The maximum grade is 2 per cent between Freiburg and Nieder-Salzbrünn; the other grades are 1½ and 1 per cent, and the difference in elevation is 1,080 ft. On the double-track line from Hirschberg to Grünthal the difference in elevation is 1,800 ft., with a grade of 2½ per cent. The curves are likewise very numerous and their radius is sometimes as low as 620 ft.

Coal of a mediocre grade, peat and coal dust will

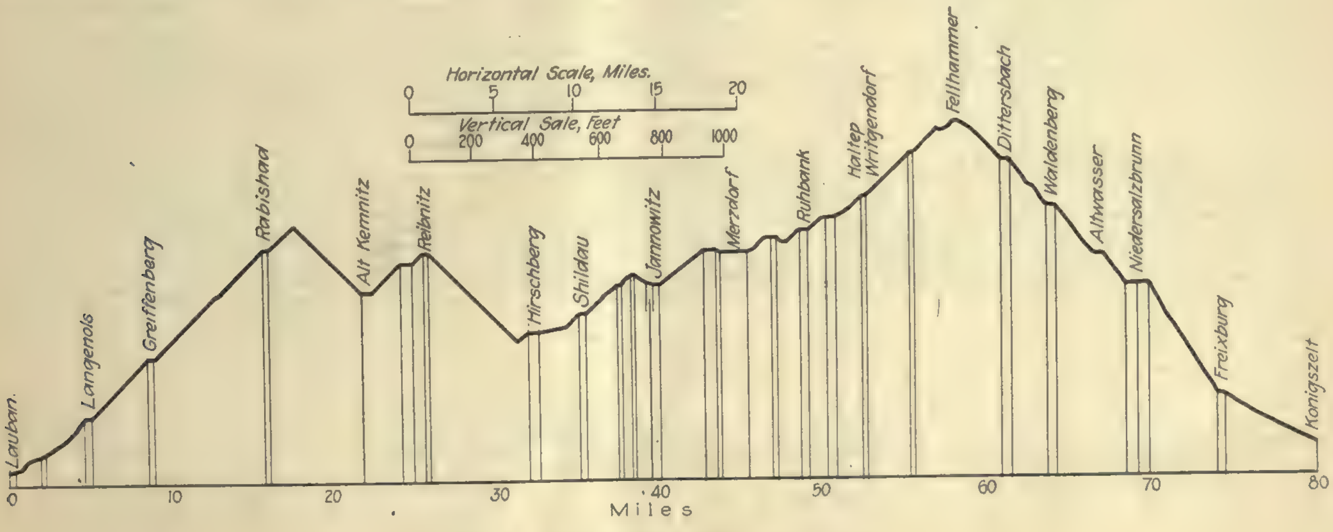


FIG. 2. PROFILE OF THE MAIN LINE

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*Based on article in *Revue Générale de l'Electricité*, Jan. 31, 1920. Original long article by E. C. Zehme appeared in *Elektrotechnische Zeitschrift*, July 17, 24 and 31, 1919.

be made to furnish the auxiliary power supply. Stations to utilize these will be constructed near the mines to save freight. A voltage of 15,000 was chosen for the contact line, using 16-cycle, single-phase current.

The principal steam plant has been constructed about 1.25 miles from the Mittlesteine station, 40.7 miles from Lauban. The price of coal at this point was 6.4 marks per ton before the war. Its calorific value was 11,000 B.t.u. per pound, on the average, with 17 to 20 per cent ash.

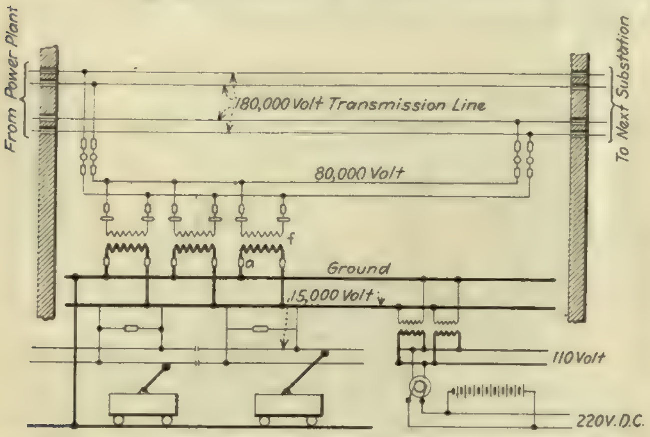


FIG. 3. CONNECTION DIAGRAM FOR NIEDER-SALZBRÜNN SUBSTATION

This station was designed for twenty-four trains, of which one-half, when climbing grades, would require 9,000 kw., the other half 3,000 kw. Four 5,000-kva. turbo-generators were installed operating at 1,000 r.p.m. and producing 3,500 volts at 16.6 cycles. The ultimate plan calls for six units. The station also contains three other turbo-generators of 2,500-kva. capacity each, operating at 3,000 r.p.m., 2,000 volts and 50 cycles. These will serve neighboring localities with power.

The single-phase voltage is raised from 3,500 to 80,000 by means of six 5,000-kva. transformers. The oil circuit breakers are of the remote-control type and the instruments and circuit breakers are on the low-tension side. To take care of sudden changes in load, the generators are furnished with Tirrill regulators and overcompounded fields which provide constant potential at all substations. The 80,000-volt buses with their protective apparatus are immediately behind the transformers.

The boiler room is planned for fourteen boilers with inclined tubes having 4,900 sq.ft. heating surface, designed for a pressure of 230 lb. per sq.in. Of these ten have been installed. The large boiler capacity provides for large variations of load. The furnaces are automatically fired, the Plut stoker system being used with forced draft. Ash removal is accomplished by the use of 600-lb. carts, pushed by man-power. The boilers are equipped with superheaters and feed-water heaters.

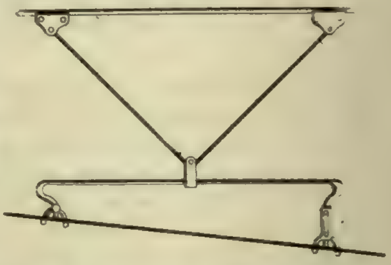


FIG. 4. CONTACT LINE SUPPORT PROVIDING FOR LONGITUDINAL MOVEMENT OF WIRE

The distances along the 80,000-volt transmission lines from the central station to the substations are respectively Nieder-Salzbrünn, 23.6 miles; Ruhbank, 35.5 miles; Hirschberg, 52.1 miles, and Lauban 77 miles. The substations are so located as to minimize line losses.

The voltage is transformed from 80,000 to 16,000 in the substations by means of air-cooled transformers. There are five of these at Nieder-Salzbrünn, four at Ruhbank, five at Hirschberg and three at Lauban, all rated at 1,600 kva. Fig. 3 gives the scheme of distribution. The high-tension line enters and leaves at the second floor level and the low-tension at the first floor.

The high-tension line, in duplicate, is composed of four wires suspended by string insulators containing five units each. The span varies from 330 to 660 ft. The line is of 185,000 circ.mil copper cables to Nieder-Salzbrünn, 130,000 circ.mil to Hirschberg, and 60,000 circ.mil to Lauban. The contact wire is of hard-drawn copper with "figure 8" section, 200,000 circ.mil area and with a tensile strength of 53,000 lb. per sq.in.

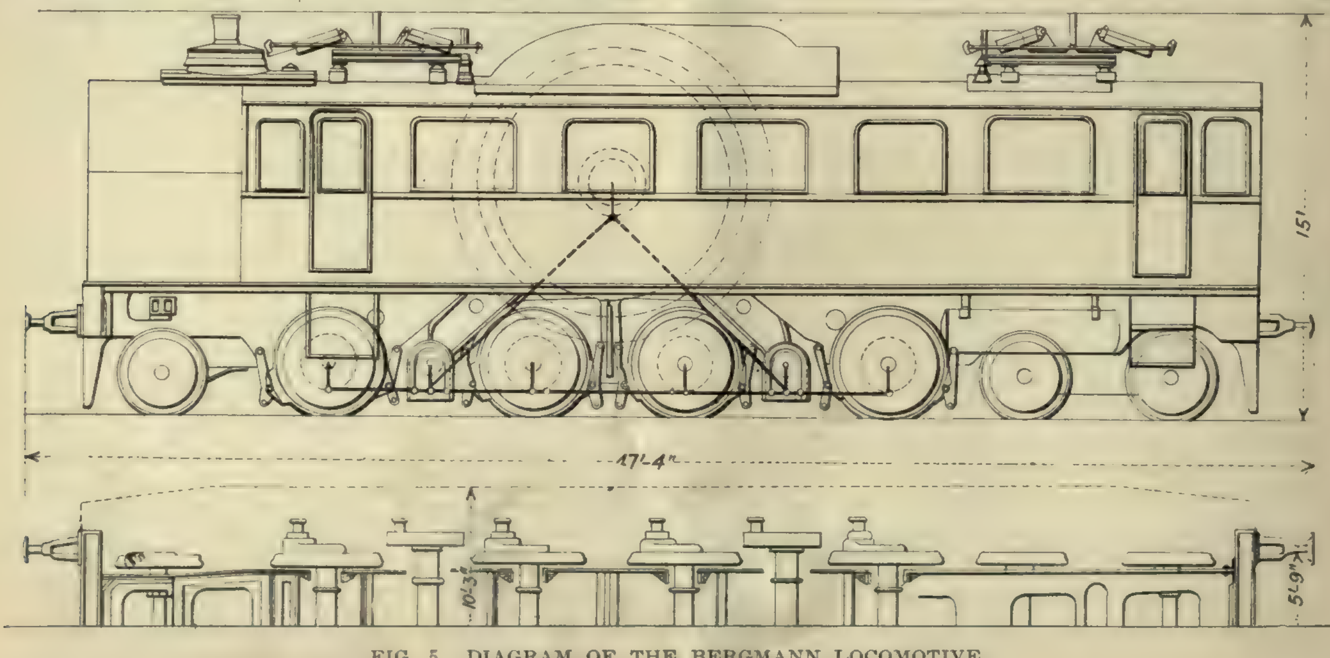


FIG. 5. DIAGRAM OF THE BERGMANN LOCOMOTIVE

The contact system is supported by catenary suspension. On part of it an auxiliary cable suspended from the messenger carries the contact wire, which alone is insulated. On another part two contact wires are suspended from the same cable. A special arrangement has been adopted to allow for longitudinal displacement of the contact wire as shown in Fig. 4.

The electric locomotives were required to comply with the following requirements: Haul 440-ton express trains, 400-ton passenger trains or 485-ton freight trains on the 2 per cent grade with curves of 580 ft. radius, and 1,100-ton freight trains on grades of 1 per cent with curves of 2,500 ft. radius, with varying intermediate conditions. The equipment includes twenty locomotives for heavy express and passenger service, thirty-five locomotives for freight service, seven locomotives for light trains, thirteen locomotives for mixed trains and six motor cars. The war greatly delayed the delivery of the locomotives.

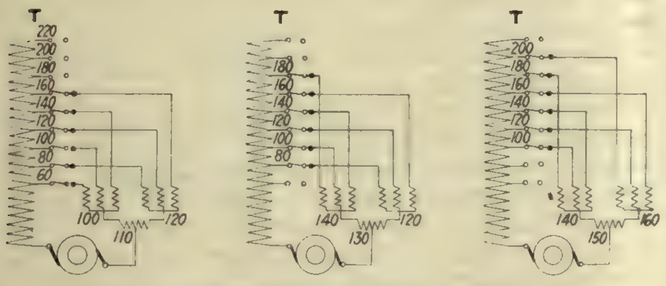


FIG. 6. CONNECTION DIAGRAM, BERGMANN LOCOMOTIVE

The side-rod locomotive built by the Bergmann-Electricitäts-Werke is shown in Fig. 5. There is one motor rated at 2,250 kw. It delivers its power by means of cranks set at 90 deg. and with intermediate jackshafts to which the wheels are coupled. The locomotive has a very regular torque.

The rear axle has no end play, but that of the center axles is 0.5 in. and that of the forward axle is 1 in. on each side. The pony axle under the boiler has over 2 in. play.

The torque corresponding to the rated power is 65,000 lb.-ft. at 240 r.p.m. The maximum speed is 380 r.p.m. Provision has been made for shifting the brushes by which means 2,250 kw. can be developed at 380 r.p.m. For this reason commutating poles are not used, but the poles have been designed so that the induction will be sufficient in the zone of commutation, whatever be the position of the brushes.

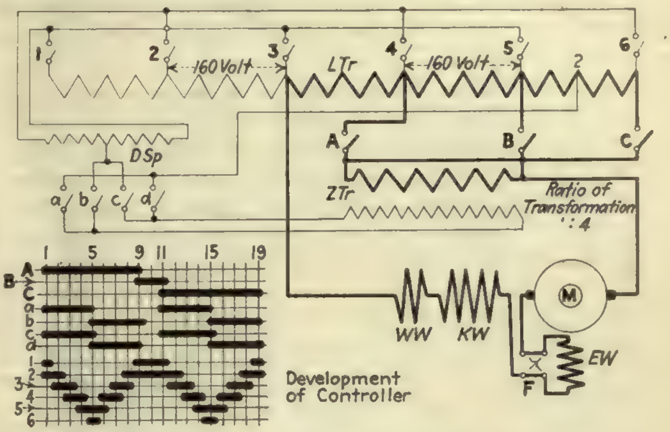


FIG. 7. CONNECTION DIAGRAM, MAFFEI-SCHWARZKOPF LOCOMOTIVE

The motor is cooled by a fan driven by a 23-kw. motor. A similar fan cools the transformer.

The driving wheels of the locomotive have been made as small as the speed of the motor would permit, the diameter being 4 ft. 1.2 in. At 380 r.p.m. this produces a speed of 56 m.p.h. The diameter of the frame of the motor is 11 ft. 5.8 in.; that of the rotor, 8 ft. 10.4 in., and that of the commutator 6 ft. 10 in. There are twenty-six poles and the total weight of the motor is about 24 tons. Regulation is accomplished by varying the electromotive force applied and by changing the brush position. The commutator for the transformer connections is operated by compressed air and operates as is shown diagrammatically in Fig. 6 herewith.

The operator controls the potential and the brush position by means of two controllers. On starting, the pantograph is raised by compressed air and the oil circuit breaker is closed. At this point the brushes are in their extreme position.

SWITCH STEPS	CONTACTORS									
	1	2	3	4	5	6	7	8	9	10
1	o o	o o	o o							
2	o	o o	o o	o						
3		o o	o o	o o						
4		o	o o	o o	o					
5			o o	o o	o o					
6			o	o o	o o	o				
7				o o	o o	o o				
8				o	o o	o o	o			
9					o o	o o	o o			
10					o	o o	o o	o		
11						o o	o o	o o		
12						o	o o	o o	o	
13							o o	o o	o o	
14							o	o o	o o	o
15								o o	o o	o o

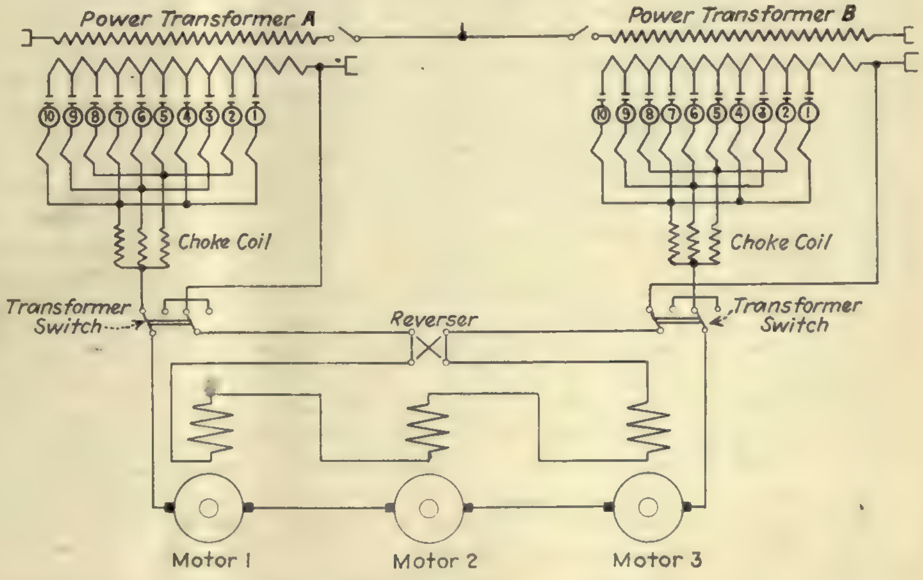


FIG. 8. CONNECTION DIAGRAM, SIEMENS-SCHUCKERT LOCOMOTIVE

In addition to the apparatus described above, mention should be made of the boiler, fired with coke burned under forced draft furnished by electrically driven fans, which is used to heat the trains.

The weight of the locomotive on the track is 119 tons, divided 18.2 tons on each driving axle and 15.4 tons on each idle axle.

A modification of the above locomotive was built with two 760-kw. motors each and a reduction of the speed by a single gear acted upon by each of the motors, the gear being on an intermediate axle placed between two driving motors. The motor speed is 900 r.p.m.

For the express trains a type of locomotive with a 900-kw. motor (1,300 kw. on the hourly rating) is used. These locomotives were built by the Maffei-Schwarzkopf-Werke and are for trains of 265 to 375 tons. They have three coupled axles spaced respectively 5 ft. 3.2 in. and 7 ft. 7.1 in. The mean speed is 28 m.p.h. and the maximum 56 m.p.h. The weight is 91.5 tons, of which 40.5 tons is for electrical equipment.

The motor is placed slightly above the axles and crank-connected through intermediate beams to the three driving axles. The motor is of the series compensating type without auxiliary resistance and without any special commutation devices. The voltage in the field coils and in the short circuit of the rotor is so low that it can be compensated with normal resistance of the commutating circuit. There are nineteen steps in the speed control, which is accomplished with the aid of an auxiliary transformer as indicated in Fig. 7. This transformer raises or lowers the secondary voltage furnished by the several windings of the main transformer.

The locomotives for freight trains carry three motors, each driving two axles by means of a counter-weighted crankshaft. The tractive effort is 35,400 lb. at 6.4 m.p.h., 16,500 lb. at 12.4 m.p.h. and 15,400 lb. at 18.7 m.p.h. The maximum speed is 31 m.p.h. These locomotives carry two pantographs and two transformers, of which the primaries are connected in parallel and the secondaries in series, insuring uniform distribution of the load.

The stators have a reversible winding to change the direction of rotation, a compensating winding and a commutating winding, the latter two being in series with the rotor. The two transformers have ten windings and the connections are so made as to obtain fifteen speed steps as indicated in Fig. 8. All of the control is electric. The ventilating and pump motors are 90-volt, the lighting is at 20 volts and the heating at 200 volts, the circuits being tapped in on the various windings of the transformers. The locomotive is operated from the extreme end, the center serving as a baggage compartment.

Motor cars have been provided for light traffic. The trains are composed of three cars. Each has a capacity of 150 persons and 3.3 tons of baggage, and can besides haul one 22-ton trailer. The motor car is placed between the two trailers; it carries one motor with two rotors, geared to an intermediate jackshaft which is crank-connected to two driving axles.

The St. Gothard Railway in Switzerland was on July 1 operated for the first time by power from the Lake Riton hydro-electric power plant.

Emmet Mercury Boiler

A Device Which Promises Increased Efficiency in Power Generation by Increasing the Working Temperature Range of Vapors Employed

THE war interrupted the development of the mercury boiler, but its inventor, W. L. R. Emmet, has obtained valuable data during the interim and it is understood that a commercial installation is to be made in the near future. Supplementing the article in the issue of this paper for March 14, 1914, page 575, the following will be of interest.

The efficiency of any heat engine can be increased by increasing the temperature range through which it works. The supply temperature can be raised or the exhaust temperature lowered to obtain the desired results. The supply temperature is limited by the combustion temperature and the heat properties of the element used in the boiler as well as by the materials from which the boiler is made. The exhaust temperature is limited by the properties of the element used and the vacuum that can be obtained.

Steam pressure becomes very great when high temperatures are obtained, so Mr. Emmet has taken mercury as his primary agent and steam as his secondary agent in a binary-vapor process. Mercury, at atmospheric pressure, boils at 677 deg. F. and condenses in a 28-in. vacuum at 455 deg. F., while corresponding temperatures of water are 212 and 101 deg. F. respectively.

In the Emmet process mercury is vaporized in a coal-fired boiler at 10-lb. pressure, the mercury vapor is passed to a single stage turbo-generator and then exhausted into a surface condenser at low vacuum and condensed by circulating water. The circulating water becomes steam in the condenser due to the high temperature of the exhaust mercury vapor and the steam is used to drive another turbo-generator, after which it is exhausted into a second surface condenser and condensed. The plant thus operates on a temperature range of from about 900 deg. F. to 101 deg. F. and uses two heat transferring agencies, mercury and water, in two separate turbo-generators.

The principle is sound and Mr. Emmet has devised practical apparatus for applying the principle. A newly designed boiler for the mercury had to be made to keep the mercury charge to minimum volume due to excessive cost of mercury. The temperatures were very high and fittings had to be obtained to withstand them. Mercury vapor is poisonous, has a bad habit of amalgamating and leaking through bearings so that materials and packing were important items. Mercury has a high density and low spouting velocity, so Mr. Emmet was forced to design a single stage turbine for the mercury vapor. The high density of mercury eliminates a feed pump for the mercury boiler as the condenser is fed by gravity to the boiler.

Inventive skill has overcome all difficulties and reports indicate an early commercial application of the process. A low pressure, highly efficient thermo-dynamic process will be very welcome in these days of high power costs. An attractive schematic layout of the Emmet plant, with the different portions shown in colors, can be found in the August 3 issue of *Power*.

The chief difficulties encountered in the commercial application of the process are connected with the selection of suitable materials to withstand the action of the mercury for long periods of time.

Coal Storage*

Factors Entering Into Spontaneous Combustion Are Numerous and Complex—A Preventive Formula Is Difficult to Find

By O. P. Hood
Chief Mechanical Engineer U. S. Bureau of Mines

THE spontaneous combustion of coal lies at the bottom of the subject of storage. The main interest in the subject lies in the large piles needed for reserve by public service utilities and the industries. Every one desires to have a perfectly simple direction for storage which will insure against loss, but, unfortunately, the matter is too complicated for a simple solution. Many of the factors involved are difficult to determine, as we have no practical means of quantitative measurement. These factors involve chemistry, physics and engineering, and the man who is in close contact with the problem of stored coal is not always a good observer in these several lines.

The heating of coal is believed to be a surface phenomenon. If a ton of bituminous coal could be delivered in a single cube each dimension would be about 2.8 ft. If the coal heats, it is due to something that goes on with respect to the surface and not something that happens inside of the piece. If the size is reduced to something about 16-mesh screen, there is an acre of exposed coal surface. It is perfectly obvious from this why it is that trouble from spontaneous combustion originates in fine coal, because the great increase in extent of surface does not begin until we get below 1¼ nut. If fine coal is kept out of the pile the heating surface is relatively so small as to remove the cause of spontaneous combustion.

A unit of area of this coal surface generates a certain amount of heat, provided it can find combining material. The amount of heat generated depends upon the temperature of the piece of coal. That is to say, coal put into storage at a temperature of 80 deg. will generate very much more heat per unit of surface than if put into storage at the temperature of 60 deg.

Another most important factor is the freshness of the broken surface. A freshly broken surface of coal has a rate of heat generation that is a function of the kind of coal. It is practically zero with anthracite and is largest with the younger coals. The quantity of oxygen contained in the coals seems to be the fairest measure of this rate, although by no means reliable. The high-oxygen coals of the Middle West and the sub-bituminous coals and lignites of the West show increasingly active rates of heating.

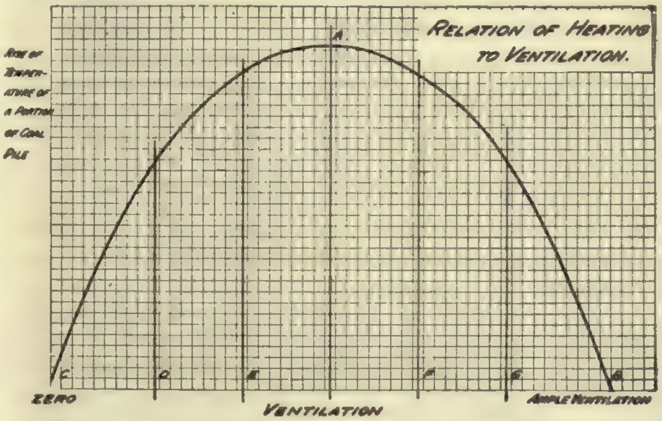
The coal surface apparently becomes satisfied in time and the heat produced falls to practically zero. This means that for the first few days or weeks a freshly broken surface is very much more active than after a few weeks or months. Fires rarely occur after surfaces have been exposed for three months.

A Problem of Ventilation

Since the rate of heating increases with the temperature, it is evident that if the heat generated is not removed the process becomes a self-aggravating one, in which case the rate of heat generation, instead of falling, may rise with time. If the temperature of the pile reaches 140 deg. or 150 deg. and continues to rise there is a very considerable probability that within a few days or a few weeks a destructive temperature will be reached and the coal must be moved. Immediately the question of getting rid of the heat is presented.

A coal pile is cooled by radiation and by movement of air through the pile. In many cases the natural changes or breathing of air is enough to carry away the heat generated. Some observers have stated that, in general, fires in large coal piles are found in the region from 5 to 8 ft. below the surface on the flanks of the pile.

We know that if coal can be sealed tight, as in a glass jar, the oxygen soon disappears and the coal cannot continue to heat because of lack of oxygen.



RELATION OF HEATING TO VENTILATION

In the accompanying graph horizontal distances represent the amount of ventilation of any portion of a coal pile and vertical distances represent rise in temperature. With no ventilation there will be no rise in temperature and the zero point will represent the condition of coal sealed from the air or so densely packed that air cannot circulate. If, on the other hand, there is sufficient ventilation, the heat is all carried away as fast as generated and some point, as at "B" on the zero line, must represent this condition, in the case of coarse coal. At some point, as at "A," between these two extremes there may be a condition of ventilation which will supply just oxygen enough to provide for a maximum rise in temperature. What sort of a curve represents all of the intermediate conditions between "C," "A" and "B" we do not know, but that the curve must first ascend and then descend is perfectly evident. This curve teaches that if we have a condition of ventilation, as at "D," an increase in the ventilation to "E" will produce a more favorable condition for a temperature rise. On the other hand, if the original condition is as "F" and we increase the ventilation to "G" we can expect a reduction of temperature. Since we have no means of knowing just what the ventilation is in any given portion of a pile, there is great hesitancy in advocating ventilating schemes for coal piles, as we are as likely to make trouble as to prevent it unless extreme and uniform ventilation is assured.

There are many more minor factors in dealing with coal storage. One of the troubles has been that undue attention has often been given to these minor factors, such as sulphur, height of pile, volatile matter, etc., while main factors, such as initial temperature, breakage in handling, freshness of coal and coal screening before storage, have been overlooked and minimized.

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*Abstract of a paper presented before the Pennsylvania Electric Association, Bedford Springs, Pa., Sept. 10, 1920.

Engineers Commend Commission

Western Society of Engineers Passes Resolutions to Controvert Agitation for Return to Local Control of Utilities

THERE is a great deal of agitation in Illinois at the present time which seeks to abolish the Public Utilities Commission in order that the control of utilities may be left to the communities in which they operate. The board of directors of the Western Society of Engineers at its meeting Aug. 25, 1920, drew up a set of resolutions commending the commission and urging its retention. The resolutions point out that the membership of the Western Society of Engineers is fitted both by training and experience to observe, study and form an intelligent opinion as to the relative merits of the present system of state regulation contrasted with the old and practically obsolete system of city control as an agent in discerning the non-functioning or the inadequacy of utility service.

SUBSTANCE OF THE RESOLUTIONS

A brief abstract of the resolutions with the main points outlined is given as follows: (1) The old method of securing the service and establishing the rates of a utility in a city was the natural but primitive one of forcing the utility to make the best bargain it could with the City Council, the bargain being expressed in the form of a franchise or contract ordinance; (2) the old system, like any commercial bargain not based on costs, resulted in poor service where rates were too low, extravagance and corruption where they were too high, and the worst kind of local politics and practices; (3) the citizens elected the City Council to represent them in the bargain. The owners of the utility company similarly elected directors and officers to represent them. This method was obviously unfair, since a square deal required a third party as judge to whom each side could present its argument for an impartial decision; (4) the old system has proved a failure after long trial, not only for reasons suggested above but also because it left the service-using public helpless against either poor, inadequate service or unjust rates during the contract period; (5) the new system of state regulation of service and rates by a commission is a natural and logical outgrowth of the attempt to remedy the obvious and unvariable faults of the old system; (6) home rule, so called, as now proposed is but a proposition to popularize the old system by giving it a good name; (7) in our opinion the only thing which has saved any semblance of adequate utility service in Chicago under present cost conditions is the fact that the contract ordinances, established by the City Council under the old system, and still fought for by the city administration, could easily be broken and overruled by the action of the state commission under the working of the new system; (8) the public might benefit under the old system except for two important facts; first, good service is more important than a low fixed rate in any city; second, no utility company can be forced to do the impossible, that is, to give good service, or service at all adequate, after its receipts cease to meet its expenses; (9) opposition to control of utilities through a state commision seldom, if ever, takes the form of objection to any feature of the regulatory law under which the commission acts. There is opposition to having a commission at all and opposition to its personnel, but no acts performed by the commission under the law and under its oath of office are pointed out as against public interest or as being unfair and unjust. The public is safeguarded from illegal or unjust acts of the commission by the fact that such acts are always subject to court review; (10) there are forty-two state commissions in the United States and five commissions in Canada and they have found it necessary and to the public interest to raise utility rates since the war. It is not a local issue, nor can the Illinois commission be pointed at as a special offender in this regard, as some are trying to make it appear. The old rates are now as impossible with the utilities as with other necessities; (11) the basis of old-time rates has changed with the tremendous changes in wages and other costs. This fact seems to us self-evident and to dispose of most of the argument to restore so-called home rule in order to get back the old 5-cent fare. It cannot be done under the old system any sooner than under the new. Service, the really important factor to the people, will be jeopardized by such a reactionary change; (12) the commission has performed its proper duty in increasing rates to meet present conditions and will be an equally effective agent in decreasing them should conditions warrant reductions in the future; (13) any attempt to impair the usefulness of the commission, to abridge its powers, and especially to go back to the old era of political control of utilities, in vogue prior to the time when commission regulation became the law, would be a distinct step backward and would constitute a grave menace to the industries of the state and to its people.

Flowability of Concrete

Apparatus Has Been Devised for Determining Important Characteristics by Means of a Simple Test

IN A recent issue of *Concrete*, G. M. Williams, associate engineer United States Bureau of Standards, gives the result of some investigations made in its concrete laboratory. These showed that the consistency or "flowability" which should characterize the concrete for any particular case is dependent upon the nature of the work, upon the type and arrangement of the forms and the reinforcing steel. For any given condition there is a minimum flowability which must be attained to result in good workmanship and in economy and also to cause the proper progress in the process of concreting.

For measuring the consistency of concrete a flow table has been developed. This consists of a metal-covered table top, which can be raised and dropped by means of a cam working at the end of a vertical post to which the top is attached. The height of drop can be adjusted by means of a bolt at the lower end of the shaft.

A mass of concrete or mortar is molded at the center of the table in a sheet-metal mold which has the shape of a hollow frustrum of a cone. For aggregates up to 2 in. maximum size, this cone has a height of 6 in. and upper and lower diameters respectively of 8 in. and 12 in. For smaller aggregates, when made up in small quantities, a cone having a height of 3 in. and upper and lower diameters of 4 in. and

6 in. is used. The mass of concrete is tamped just sufficiently to fill the form completely. The form is withdrawn and the table top is dropped fifteen times through a distance of ½ in. Two diameters, at right angles to each other, are measured—the long and the short if difference is apparent—by means of a self-reading caliper, which is so graduated that the sum of the two readings is the value for flowability. This may also be calculated by dividing the new diameter by the old and multiplying by one hundred.

Although this flow table was first employed as a means of measuring consistency of concrete, it may also be of value in the control and measurement of segregation, the time of set and the normal consistency and also in the selection of concretes to be used for steel.

Knowing in advance the type of construction, experience will permit the minimum usable flowability to be estimated, and for any required strength value the necessary ratios of cement to aggregate may be selected. The selections may be checked by the results of field tests of concrete and a few trials will indicate strength variations, which may result for the degree of thoroughness of field inspection employed, and permit a proper allowance for unavoidable variations in cement, aggregate and curing conditions.

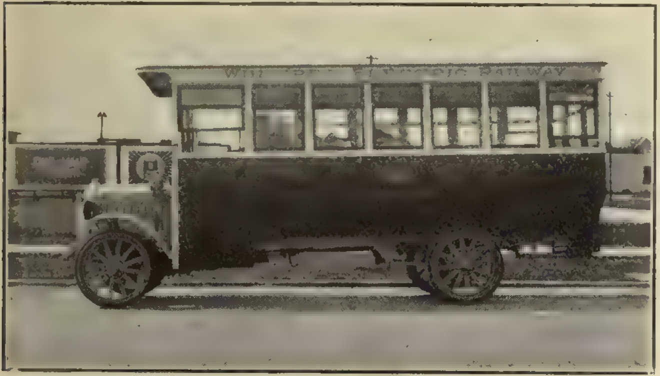
Winnipeg Railway Uses One-Man Buses

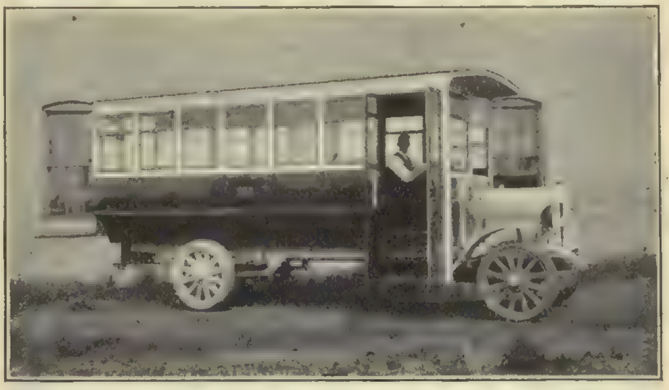
THE Winnipeg Electric Railway uses a number of buses on two routes. A type of bus has been developed by the company's engineers which seems well adapted to the local conditions, and the buses have been built by the Sterling Body & Carriage Company of Winnipeg. The general features of the bus are clearly indicated in the accompanying illustrations.

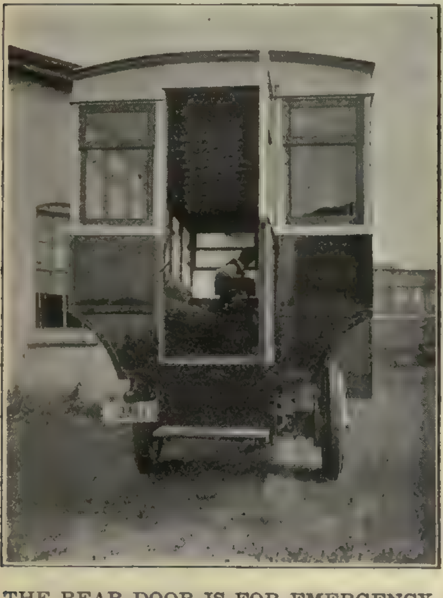
The chassis is a 1½-ton Sterling truck and the body has a capacity of twenty seated and fifteen standing passengers, a total of thirty-five. The bus is operated by one man, who controls the entrance and exit doors, located at his right.

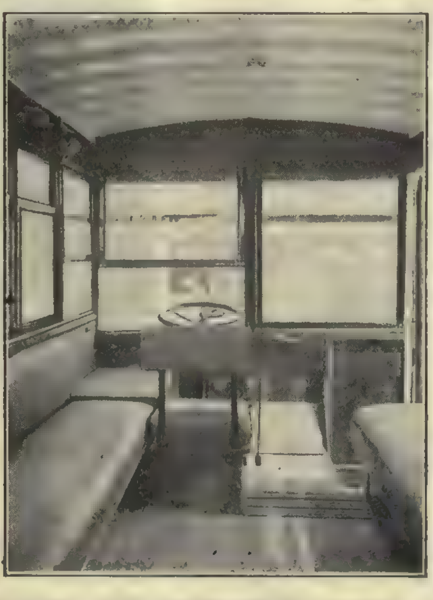
A novel feature of the design is the auxiliary rear exit, which is for use only in emergencies. The door is interlocked with a step which slides in and out on tubular guides. The door is opened and the step pushed outward by means of a strong spring which is released by a trigger at the driver's left hand. The manual closing of the door automatically returns the step to its normal place under the body. Not only is this device installed on the new buses that have recently been completed but the older ones have been equipped with it also.

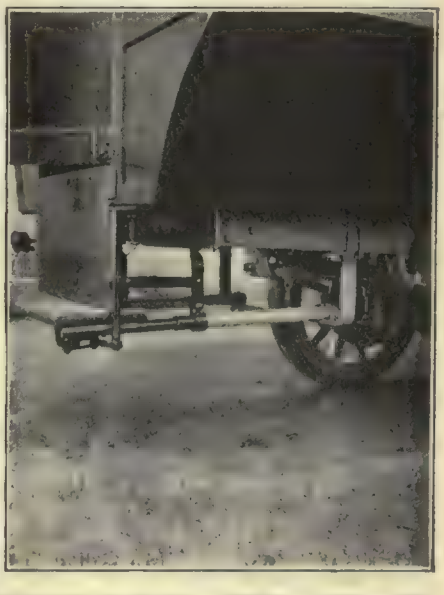
This bus is heated by means of the exhaust gases from the engine.


THIS BUS SUPPLEMENTS THE RAILWAY SERVICE IN WINNIPEG


THESE DOORS FURNISH INGRESS AND EGRESS EXCEPT IN EMERGENCY


THE REAR DOOR IS FOR EMERGENCY USE ONLY. IT IS CLOSED BY HAND


VIEW LOOKING FORWARD IN THE WINNIPEG BUS, SHOWING OPERATOR'S SEAT


STRONG SPRING OPENS DOOR AND PUSHES OUT STEP WHEN RELEASED BY TRIGGER

Overhead Contact System Records

A RECENT paper of Sir Philip Dawson before the Institution of Electrical Engineers gives some concrete results of operation in connection with the overhead contact system of the London, Brighton & South Coast Railway, one of the oldest electrifications in England. The Brighton electrification employs single catenary construction with 6,700-volt single-phase trolley. Mr. Dawson says that the principles adopted in laying out the overhead system in 1907 were: That the conductor wire should be flexible with no hard spots, that double insulation was essential, that the mechanical and electrical factors of safety in insulators and overhead must be ample, that insulators should be placed in such a position as to get minimum moisture and smoke, that lines should be sectionalized, that insulators should be used only under compression and that elastic substances should always be placed between the insulator and its support and between the insulator and the wire it supported. The system was installed with great care as it was an original attempt at electrification. The "overhead" has proved to be durable and has not been changed since 1908.

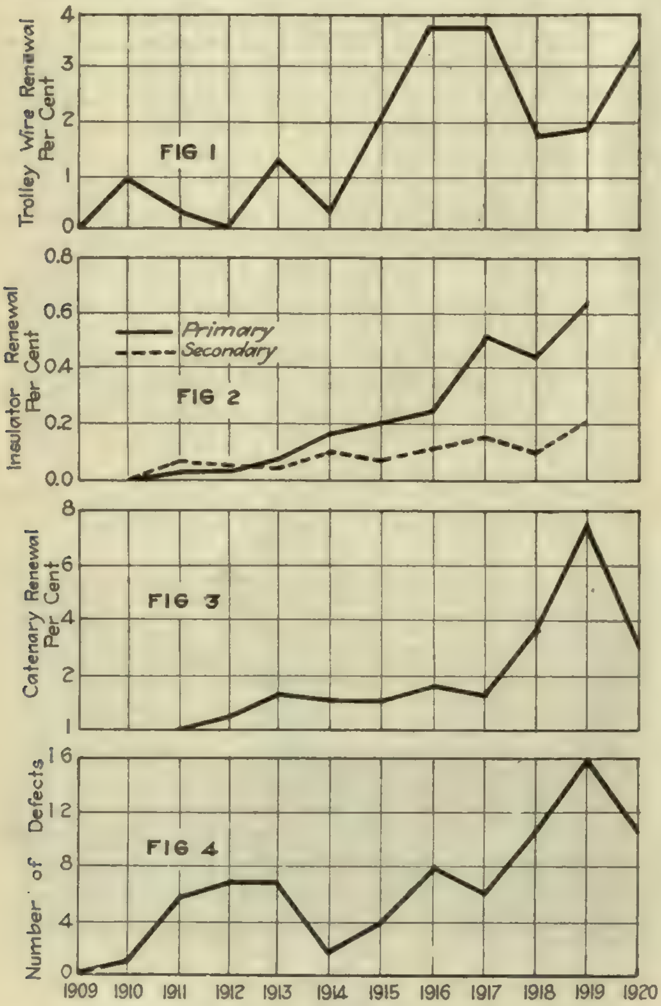


FIG. 1—CONTACT WIRE RENEWAL, IN PER CENT PER ANNUM. FIG. 2.—INSULATOR RENEWALS. FIG. 3—CATENARY (MESSENGER) WIRE RENEWAL. FIG. 4—OVERHEAD DEFECTS CAUSING MORE THAN THREE MINUTES' DELAY TO TRAFFIC.

A decided difference in overhead maintenance is noticeable on the section that uses only electric trains as compared to the sections using both steam and electric. The hot gases and smoke from the steam engines cause a much heavier maintenance expense on the divisions having the dual traffic. Not a single primary or secondary insulator, out of 7,000 primary and 14,000 secondary, has been renewed on the divisions using electric trains only. The accompanying graphs show the insulator renewals and traffic delays due to overhead defects since the system was installed.

The wear of the trolley wire was found to be proportional to the current collected by the bow collectors and was inappreciable for light currents. The system uses about 120 amp. per collector-bow strip at starting and 35 or 40 amp. at full speed. The renewals in trolley and catenary wires were very much greater on the steam-electric divisions than on the electric only, where not a single catenary wire in 150 miles has been renewed. The increased percentage in renewals on the system are shown on the charts for 1916-1917, when wartime traffic caused an increased use of steam locomotives.

The author, in conclusion, states that the Brighton experience has shown that much cheaper and simpler overhead construction can be used with satisfactory results.

Keeping the Subway Dry

ONE of the problems of subway construction is to get rid of the water that invariably drains into underground structures. In the deep tunnels of the New York Municipal Railway, operated by the Brooklyn Rapid Transit Company, which run from Brooklyn through Manhattan and into Queensborough, this problem is particularly serious. An accompanying illustration shows a pumping installation that is typical of the twenty-five stations draining this system. It is located 70 ft. underground and is designed for emergency work in connection with the tunnel under the East River.

There are two pumps, one a 4-in. x 6-in. Gould Triplex plunger type, with capacity of 50 gal. per minute, driven by a 2-hp. direct-current Westinghouse motor, and the other a Morris centrifugal, with a capacity of 1,000 gal. per minute driven by a vertical 100-hp. direct-current motor of the same make. Under normal conditions, the small pump has ample capacity to take care of the seepage, but in case of emergency the large pump can be used.

VERTICAL MOTOR DRIVING CENTRIFUGAL PUMP IN SUBWAY. FLOAT SWITCHES AND SUMP AT LEFT

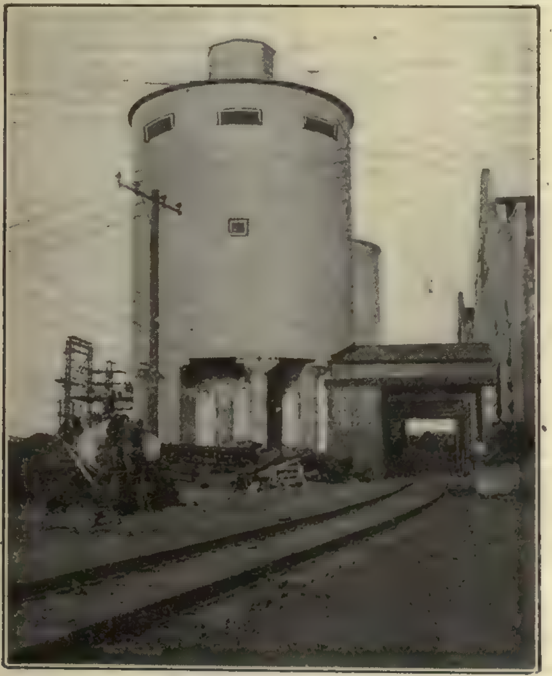
Both pumps are arranged for automatic control. The water collects in a sump in which there are two float switches, one for each motor. When the water level rises to a predetermined point the float switch of the smaller motor closes. This energizes an automatic contactor which starts the pump. When the water in the sump is brought down to the proper level the float switch opens and stops the pump. Should the smaller pump be unable to handle the flow and the water continue to rise the large pump is automatically started by the second float. A noteworthy feature of the installation is that all equipment occupies a floor space of only 12 x 15 ft.

Industrial Conference Board Moves

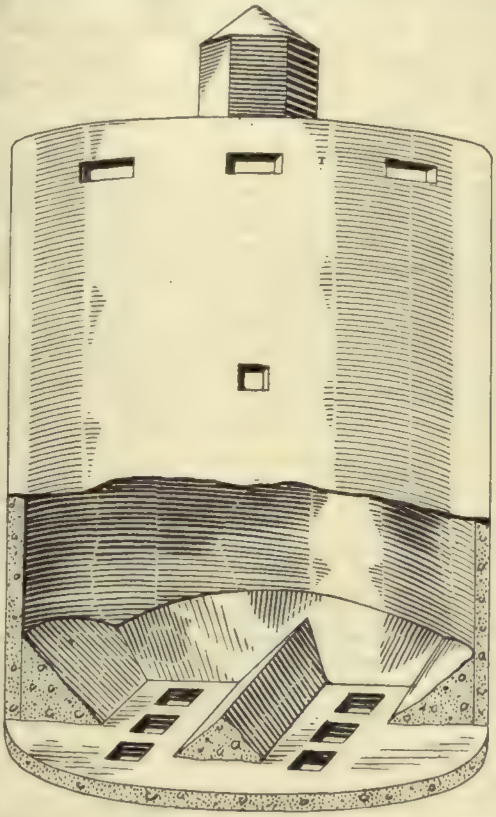
THE National Industrial Conference Board, whose headquarters heretofore have been in Boston, has moved its main office to 10 East Thirty-ninth Street, New York. A great deal of attention has been given to a study of industrial-economic problems and many data on these subjects are constantly being collected and analyzed. The board invites business executives, economists and others interested to visit these headquarters and utilize the information which it has. Among recent publications of the board is a small eight-page folder which explains the principal features of the Constitution of the United States. It is issued primarily for the use of employers and others who wish copies for distribution on Sept. 17, the anniversary of the completion by the Federal Convention in 1787 of the draft of the present Constitution.

Coal Heats in Silo Bunkers

A NEW type of concrete bunker for the Cos Cob station of the New York, New Haven & Hartford Railroad was described in the ELECTRIC RAILWAY JOURNAL for Jan. 17, 1920. Two of them were installed and have proven successful with the exception that trouble has occurred due to heating caused by the coal packing in the bunker. The bunkers have bottom gates, through which the coal drops to the conveying apparatus. Experience has shown that coal gets pocketed in certain parts of the bunker, and this pocketed coal heats to such an extent as to render conditions dangerous, due to a possibility of the explosion of the generated gases. This heating and packing of the coal (Pennsylvania mine run) is accentuated if it is wet or damp when placed in the bunker.



BUNKER WITH VENTILATING OPENINGS



SKETCH TO SHOW CHANGES MADE IN BUNKER

These bunkers are cylindrical, 40 ft. in diameter and 46 ft. high, and hold 1,000 tons of coal each.

To try to eliminate the trouble large ventilating windows, 18 x 36 in., have been cut at intervals around the top of each bunker, through which gases may escape and air circulate. Also, about 20 ft. from the bottom, an 18 x 18 in. poke hole has been made, by which, from a platform, not shown in the photograph, an operator can dislodge the packed coal in the bunker at certain intervals. Another remedy was a reshaping of the concrete around the sides at the bottom of the bunkers to form a 45-deg. slope and the erection of a concrete prism in the center with sloping sides so as to facilitate the flow of the coal to the exit doors and to prevent any space for coal to pack.

These concrete deflector walls have not been entirely successful and plans are formed to use 60-deg. deflecting walls, made from metal. It is expected that the changes, when complete, will entirely eliminate the difficulties which have been encountered.

A survey of the power situation in New England by the power section of the War Industries Board indicated that by 1924 the annual energy production by central stations would reach 5,000,000,000 kw.-hr., about one-half of the total. An increase of 1,400,000 kw. in generating capacity between 1919 and 1924 was estimated. The 1920 output for electric railways' steam plants was estimated at 630,000,000 kw.-hr. and for railroads 77,000,000 kw.-hr. The figure for electric railway hydro plants was 12,000,000; none for the railroads.

More Opinions from the Industry

Intrinsic Value of Federal Electric Railways Commission Report Is Recognized, Although Authorities Differ on Details

IN THE ISSUE of this paper for Sept. 4, page 461, the opinions of a number of railway men and public utility commissioners regarding the recently issued report of the Federal Electric Railways Commission were given. A supplementary group is printed this week.

These comments should be of great value to the railways which will have occasion to cite the findings of the report and readers are invited to contribute further to the discussion.

John H. Pardee

President American Electric Railway Association
President the J. G. White Management Corporation, New York, N. Y.

The report of the Federal Electric Railways Commission, considering the various interests represented by the personnel of the commission, is remarkable in that it is unanimous and in so many of its recommendations meets and pronounces the views and principles of those engaged in the industry.

The points which are so essential and which stand out pre-eminently are:

1. The electric railway "is an *essential public utility.*" This has previously been questioned in some quarters.
2. There is nothing in the experience thus far obtained that indicates that municipal ownership "will result in better or cheaper service than privately operated utilities could afford if properly regulated."
3. "That private ownership and operation must as a general rule be continued for an extended period."
4. "Public control must be flexible enough to enable" electric railways "to secure sufficient revenues to pay the entire cost of the service rendered, including the necessary cost of both *capital* and *labor.*"
5. "The electric railway industry as it now exists is without financial credit."
6. "Restoration of credit involves a readjustment of relations which will remove public antagonism, provide public co-operation and insure to the investor the *integrity* of his investment and a fair rate of return thereon."

I believe the report will have great influence in promoting action, and proper action, in the solution of our problems by regulatory bodies except in localities where petty politics prevent.

R. T. Higgins

Chairman Connecticut Public Utilities Commission, Hartford, Conn.

The report of the Federal Electric Railways Commission is exceedingly commendable for its plain and concise statement pertaining to a large, intricate problem involving so many special and local conditions and considerations. Its brevity in a thorough analysis of street railway problems warrants its careful perusal by all students of, and all persons interested in, the street railway industry.

While there can be no arbitrary enforcement of the reforms suggested by the commission, I believe the thorough investigation and report of the Federal commission will have a beneficial effect on the street railway industry as a whole.

The service-at-cost theory suggested by the commission is, theoretically, the principle upon which all utility companies are operated, under public regulation, but when put into actual practice under contract, involving the payment of a specified dividend as one of the fixed charges, I fear that the immediate translation of a near bankrupt or a non-dividend-paying company into a 6 or 8 per cent dividend-paying company will be liable to cause a violent shock to the industry itself.

The revenues of a street railway company are collected in comparatively small amounts, in cash, by a large number of unbonded and frequently short term employees, upon whose accuracy and honesty the company must depend. Whether justified or otherwise, the traveling public feels that there is not collected for the company's needs the full amount of revenue that the actual travel would indicate. I regret that the commission did not discuss or suggest reforms in the collection system pertaining to the street railway industry.

Joseph K. Choate

Vice-president the J. G. White Management Corporation, New York, N. Y.

The report of this commission in my opinion clearly states the pertinent condition of the electric railways of the United States frankly and fairly. I agree with the general recommendations of the commission with the exception that I never have been a believer in the service-at-cost plan of operation of utilities. The service-at-cost plan is simply a modification of municipal ownership.

I am still a believer that private ownership and operation will prove the most satisfactory to all concerned, provided the public and the officers of municipalities are willing to concede that the company should earn a fair return upon a fair valuation; if, however, such a condition cannot be brought about municipal ownership is the only solution left for electric railways.

Clarence M. Clark

President the E. W. Clark Management Corporation, Philadelphia

There can be no question as to the value of the enormous amount of work done by the members of the Federal Electric Railways Commission. Whether or not we agree with all of the conclusions, we must recognize the assistance which this report will be to the state commissions, municipalities and railway corporations in the solution of the railway problem. It is not to be expected that satisfactory results will follow in all cases throughout the country, but this report points the way and makes many valuable suggestions. If I were inclined to be critical, which I am not, I would call attention to the fact that the railways of this country, like the steam railroads and the industries of the country, have been built up and developed by the opportunities offered to investors to make money. Under the stimulus of that incentive the best and most extensive service has been given to the people by the electric railway industry. In recent years there has been no such incentive and the service has declined, and it will be impossible to secure the same quality of service and progress in the art by any other incentive than that of making money. This feature of the case is not adequately covered by the report of the commission. It is, of course, not impossible to work out a service-at-cost plan which will give the owners and investors in the property an opportunity to make more than a mere fair return upon a fair value of their property, but the necessity therefor has not been properly recognized or covered, and the tendency is the other way.

Letters to the Editors

Accident Reduction by Safety Car Operation

TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY
TERRE HAUTE, IND., Sept. 7, 1920.

To the Editors:

The article on the lessening of accidents by safety cars by W. H. Burke, which appeared in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 4, page 457, is very timely. Our experience in Terre Haute confirms the results cited by him. We have compiled the following data which will be of interest by way of comparison with those given by Mr. Burke:

COMPARATIVE ACCIDENT RECORDS OF SAFETY AND TWO-MAN CARS, DEC. 1, 1918, TO AUG. 31, 1920, 21 MONTHS.

	Safety Cars	Two-man Cars
Total accidents reported prior to August, 1920	639	270
Accidents reported during August	47	0
Total accidents reported	686	270
Deduct accidents causing no damage to persons or property	496	111
Accidents involving expense	190	159
Total cost of accidents	$27,135	$22,181
Average cost per accident (of all accidents reported)	$39.55	$82.15
Average cost per accident (of the accidents involving expense)	$142.81	$139.49
Total car-miles operated, thousands	3,236	1,405
Accidents of all kinds per 100,000 car-miles	21.1	19.2
Accidents involving expense per 100,000 car-miles	5.87	11.31
Car-miles per accident involving expense	17,305	8,841
Accident cost per 100,000 car-miles	$8.38	$15.78
Average number of cars operated at beginning of period	15	16
Average number of cars operated at end of period	48	3

The rapid increase in the number of automobiles in use in the city is reflected in the number of accidents occurring monthly, but it is a noticeable fact that the percentage of those causing expense is proportionately much greater with the two-man cars than with the safety cars. It is noticeable also that in spite of the much greater average number of safety cars in service the total number of accidents of any degree of seriousness is only slightly greater. But after all the significant thing is the accident record reduced to unit terms, which shows that while the total reported accidents number about the same per 100,000 car-miles, the accidents involving expense are but slightly more than one-half for the safety cars. If it were possible to allow for the effect of increasing automobile traffic density the showing for the safety cars would be even better.

E. M. WALKER,
General Manager Terre Haute Division.

More Rides May Occur with Fewer Car-Miles

NEW YORK, Sept. 6, 1920.

To the Editors:

Your editorial of Sept. 4 entitled "Fare Is Not the Only Factor Which Affects Riding" is very much to the point in setting forth that there are at least a dozen factors that alter the riding, be it in rides taken by a stationary population or by a growing population within the same transport area. However, the whole problem is so diversified that it is not safe to assume that traffic will show no large increase despite failure to increase trackage and service. The British tramways are certainly a conspicuous example of increased traffic and even of increased riding habit in the face of decreased mileage. Without going into detail figures, it is a fact that for the greater part of the World War and for months following the Armistice the street railways of the United Kingdom gave less car-miles than just before the war. This did not in any way prevent an increase in patronage and riding habit. The traffic density figures show as much as a 50 per cent increase in passengers per car-mile over a four- or five-year period, this being the joint result of more riders and fewer car-miles.

There is no space in a communication like this to go into the reasons for this increase in traffic, but one curious difference with America may be pointed out: In this country the enlistment of men for the army, with a consequent increase in female workers, was given as a cause for decreases in traffic. In Great Britain, where the proportion of men enlisted in war and of women enlisted in industry far exceeded the drain in the United States, the advent of women workers was given as one reason for increases in traffic! Without wishing to dogmatize too much, I feel that the upsets in our unit fare system did much more to discourage traffic than the earlier increases in Great Britain, for these being on the zone system caused much less disturbance of fare-paying habits. The much heavier increases which are being made today as the result of a 200 per cent (not 100 per cent) increase in operating expenses are cutting into British traffic for the first time since 1914. WALTER JACKSON.

Manual Versus Automatic Block Signals

NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KY., Sept. 3, 1920.

To the Editors:

In your issue of Aug. 14, page 321, C. A. Elliott of the Pacific Electric Railway describes a manual system of so-called "dual control signals" as evolved and used on the Pacific Electric. As manufacturers of automatic signals, we cannot indorse this system as heartily as does Mr. Elliott, who describes it as a satisfactory substitute for the complete automatic block signal for light traffic. It is a hand or manual system, operated by a conscious act of the motorman or conductor, both to set and to clear the signals. It is a matter of fact, which the writer regrets to observe, that the usual electric railway hand signals will be operated or not, at the fancy of the car crews, in spite of all rules to the contrary. He has seen such signals deliberately left untouched by the car crews and on questioning them was told there was no car coming the other way against which the signals were designed to afford protection. How did they know this? The very object of the signal is to give warning against a possible and unknown opposing movement. It is human nature for the motorman, who sets and clears the signals so many times, needlessly (?) to fail to do eventually what looks like unnecessary work. This is the very time, however, the unexpected may occur, and if the motorman of an opposing car should be in the same frame of mind, conditions would be highly favorable for a collision.

In other words, no hand signal, no matter how perfect, is a check on all other safeguards. An automatic signal, on the other hand, which is operated regardless of any special act on the part of the motorman more than driving his car, will show the presence of his car in the block at all times, whether there be an opposing car to observe this indication or not.

The system of indications described by Mr. Elliott is not a consistent one, since the same end of the block may show red and green at the same time; also the motorman must observe the signals on one side of the right-of-way for proceeding and on the other side of the right-of-way for stopping, another illogical arrangement. I note, moreover, that the manual switch was made from a relay by stripping its coils, all of which seems to prove to us that the designer went considerably out of his way to avoid simple automatic signals of the trolley contact, non-counting type, which would have real advantages of safety. Such signals cost but little more than these hand signals, have perfectly logical indications and could have an auxiliary control incorporated where steam trains occasionally traverse the same territory.

The writer has seen hand signals similar to these described in use on the York (Pa.) Railways.

CARL P. NACHOD, President.

Comments on Wilcox Statement

Secretary Edward F. Sweet Explains the Publication of the Federal Commission Report

IN AN interview published in the Washington *Times* of Sept. 3 Edward F. Sweet, Assistant Secretary of Commerce and vice-chairman of the Federal Electric Railways Commission, comments on the statement recently issued by Dr. Wilcox in regard to the Federal commission report, particularly his remark that "funds for printing the testimony and the commission's own report are being supplied by the American Electric Railway Association." Mr. Sweet is quoted, in part:

> If Dr. Delos F. Wilcox, the municipal ownership advocate, seeks to imply that the Federal Electric Railways Commission, which recently reported to the President, was in any way influenced or dominated by the electric railway companies his inference is insulting.
>
> The proceedings of the commission are being published through the executive secretary, the commission having ceased to exist after submitting its report. The work is being done by the Government Printing Office. It is true, I learn on inquiry, that the superintendent of documents has received orders for a sufficient number of copies of these proceedings to pay for the entire cost of publishing it. This, however, is something the commission had nothing to do with and it had nothing to do with our decision to have the testimony printed.
>
> In employing Dr. Wilcox to analyze the testimony for our convenience, we did not enter into any engagement to adopt his conclusions, which his testimony showed to be enthusiastically inclined toward municipal ownership. We intended to have an eminent traction expert also to make an analysis and use the two for our guidance, but were forced to depend entirely upon Dr. Wilcox's analysis. Eight men looking at the question from different angles formed the commission, and the report which they did make was unanimously approved by them.
>
> Dr. Wilcox's conclusions are all contained in his testimony, which will be published in the proceedings and made available to any one who is interested.
>
> Personally, I am in favor of municipal ownership of some public utilities, such as public water works, and possibly lighting plants, but when it comes to an enterprise with as many employees as an electric railway there are other questions to be considered. Mayor Ole Hanson of Seattle told us he had favored municipal ownership to keep railways out of politics, but later found that it simply placed them in.
>
> We were in no way bound to accept Dr. Wilcox's recommendation. If he seeks to discredit the commission by leaving the public to infer that an association of interested corporations had any part in the report to the public he goes far afield.

Association News

ATLANTIC CITY CONVENTION, OCT. 11 TO 15

Convention Program Progressing

DETAILS of the American Association convention program are rapidly taking form. George M. Graham, vice-president Pierce-Arrow Motor Car Company, will speak on the topic "The Motor Truck—Competitor or Ally?" The place of the motor bus as a feeder and supplement to the electric railway will be made the subject of a comprehensive discussion also.

On the problems of fuel supply, Eugene McAuliffe, president Union Colliery Company, St. Louis, Mo., and formerly manager of the fuel conservation section United States Railroad Administration, will speak.

The names of other speakers are not yet available, but negotiations are under way with men of national reputation to discuss the following topics: Freight and express traffic, labor, training of electric railway personnel, an outside view of the electric railway industry. Reports of the committees on valuation, fare systems, publicity and national relations will also be made the basis of special discussion.

Committee Meets on Yacht

THE American Association committee on company membership held a meeting on Aug. 31 on board the 120-ft. steam yacht *Tilicum*, loaned by E. H. Close, a real estate operator of Toledo, Ohio. The yacht left Toledo at 10 a.m. and cruised on Lake Erie, Lake St. Clair and connecting waters until midnight. The members of the committee in attendance were: Frank R. Coates, Toledo, chairman; E. M. Walker, Terre Haute, Ind.; L. E. Gould, Chicago, Ill.; E. F. Wickwire, Mansfield, Ohio, and H. H. Norris, ELECTRIC RAILWAY JOURNAL. A number of officials of the Toledo Railways & Light Company accompanied the committee.

The committee went over reports received from representatives in several states as to the results of a canvass of non-members and prepared a revised list of prospects. A report from Secretary E. B. Burritt indicated an encouraging number of accessions to the membership this year, both railways and manufacturers, with good prospects of additional ones in the near future. The committee outlined its report, which will be completed at once and filed for publication in advance of the convention.

Association Can Supply Copies of F. E. R. C. Report

COPIES of the report of the Federal Electric Railways Commission, which was printed in full in the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 28, can be had on application to the office of the American Electric Railway Association, 8 West Fortieth Street, New York City. The association's office has notified the ELECTRIC RAILWAY JOURNAL that Chairman Elmquist of the commission and other members are being overrun with requests for copies of the report, hence the attention of persons desiring copies should be directed to the above-mentioned source of supply.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Toledo Plans Take Shape

Both Sides Preparing for Referendum on Traction Measures—Women Voters to Be Heard From

With the vote on Toledo's two plans of electric railway settlement only six weeks away and with the enfranchisement of nearly 75,000 women voters who have never before expressed their opinion at the polls on municipal questions, the campaign for "enlightenment" of the public has barely got under way.

City Explains Measures

The Toledo *City Journal*, which is the mouthpiece of the city administration, has explained the two measures and printed the complete text of both plans—the cost-of-service ordinance and the twin bond issues appropriating $7,000,000 for Council to provide a city-owned "transportation system." The newspaper says the choice is between "city ownership and city regulation."

City officials declare that it is too early to start an active campaign for the cost-of-service franchise ordinance. They are counting on the four weeks previous to the actual day of election to suffice for "instruction" of voters.

The labor unions which have united in favor of the municipal-ownership ordinances have had difficulty in obtaining members of a committee to head their campaign against the cost-of-service plan and in favor of the public-ownership plan.

The organized platform workers and electrical men employed by the Toledo Railways & Light Company worked for the defeat of the twin ordinances before and they are determined to do so again. The service-at-cost measure has apparently satisfied them that labor will receive fair treatment under its provisions.

Politics to Be Eliminated

The elimination of "politics" from Toledo street railway matters is considered the big question in the settlement which will come before the people on Nov. 2.

The city-ownership plan for bonding the city and handing the $7,000,000 over to the council for expenditure is considered a return to the political football tactics of the last twenty-five years in Toledo traction history. On the other hand the service-at-cost measure has been safe-guarded to eliminate politics for good.

Under the latter plan a board of street railway control to consist of three persons would be appointed by the Mayor, one for a term of two years, one for four years and one for six years. This is designed to take the control of the appointment out of any one administration. The members of the board shall serve without compensation so that the offices shall not become political "plums." The members shall not be charged with any other part of the government of the city, shall not be in the employ of any interested parties, shall not be shareholders or bondholders of the traction company, and shall not be members of the General Assembly of Ohio.

The board is to recommend the nomination of a Street Railway Commissioner who shall be appointed by the Mayor. This commissioner will have the active charge of all the transportation questions, check all books, and look after the city's interest in the economical operation of the street railway system.

It is believed that the effect of these politics-proof provisions and the bringing in of big improvements to the system will have a vote-getting power in the coming election. The results of the last vote on the twin municipal-ownership bond ordinances indicated that the people of Toledo for the first time in street railway history had begun to think in figures. This is the most hopeful sign for the cost-of-service ordinance, officials of the Rail-Light believe.

Wage Settlement Basis Reached

The Kentucky Traction & Terminal Company, Lexington, Ky., and its union employees, who are demanding an increase of 20 cents an hour, have reached "a practical basis of agreement," according to the union's representative. A federal conciliator who interceded in the case has gone to Washington to procure statistics on the increase in the cost of living and when the data are sent to Lexington the company and its men will try to reach an agreement.

City Plans Equipment Purchase

The Board of Estimate of New York at a special meeting on Aug. 31 unanimously authorized the issuance of revenue bonds in the amount of $300,000 from the sale of which electric railway cars and equipment are to be purchased. The cars are to be used in sections where cessation of transportation service has been caused by either strikes or lockouts. While no definite statement has been made, it is presumed that the city has in mind using some of the equipment on the Staten Island Midland Railway, service over which has been suspended for several months.

Denver Men Clamorous

No Members of New Working Force to Be Replaced by Strikers—Few Men Needed

Failure greeted the efforts of Governor Oliver H. Shoup of Colorado to effect a setlement of the Denver Tramway controversy with company and labor leaders on Sept. 3. F. W. Hild, general manager of the company, refused to negotiate further with the striking trainmen, flatly rejected the proposal of the men that they be taken back in a body and with full seniority rights as of July 31 and declined to discharge any members of the new working force which has been hired to replace former employees.

Mr. Hild Rejects Overtures

After the conference in his office Mr. Hild said:

> As far as we are concerned the strike is over absolutely. We informed union representatives that the new proposal of the men was entirely out of the question; they requested that we meet with a committee from the union in another conference and we refused the request. We told them we had held the door open for the former employees as long as we possibly could.

One of the points which was taken up at the conference was the ten new sections of a working agreement which the Amalgamated officials, in meetings with the company held prior to the calling of the strike, had endeavored to have included. President J. C. Bulger of the Colorado State Federation of Labor professed ignorance of these ten sections and asserted that three of the sections were contrary to union principles.

In a mass meeting held on Sept. 5 the strikers voted to have no more dealings with Mr. Hild. No new plan was formulated for presentation to the company although the discussion lasted three hours. This action is considered to be in retaliation for Mr. Hild's refusal to meet with the union committee.

On Sept. 8 martial law was declared ended and 250 troops returned to Camp Funston. The remaining 300 men will be held until the new state constabulary is firmly established.

Following charges of misappropriation of funds contributed by union labor to the relief of the striking carmen, the president of the Trades & Labor Assembly appointed a committee to audit the accounts of Amalgamated Local 746. Sensational charges have been made to the effect that needy strikers were not given relief and that money remained unaccounted for.

On Sept. 9, 709 trainmen and 51 students were on the cars. Only 125 to 150 more men are needed to give the company its full quota.

Brooklyn Organization Being Rebuilt

Service Gradually Being Restored by Management, Hard at Work Replacing Strikers with Permanent Employees

Service on the lines of the Brooklyn Rapid Transit System is being restored to normal just as fast as possible under existing conditions. An entirely new train service organization is being built up. The energies of Mr. Garrison as receiver have been bent, first, to giving the maximum service on the rapid transit and elevated lines, and second, to the surface railways. Mid-day service on the rapid transit and elevated lines had been normal for several days previous to last Thursday, but the rush-hour service up to that time had not been fully restored. The motormen on the rapid transit lines are affiliated with the Brotherhood of Locomotive Engineers. They have a separate contract with the company and did not go out. So far as the surface lines are concerned fifty-one out of sixty-seven lines were in operation on Thursday during the day time and it was anticipated that service at night would be resumed very shortly. To the company the strike is a thing of the past except so far as the officials are called upon to rebuild their operating organization depleted by failure of the strikers to return. The time limit for old employees to return to work expired on Wednesday.

AS REGARDS the strike settlement the final word for the company appears to have been said by Judge Mayer on Sept. 2, when he issued a statement giving five terms upon which the strike might be ended. In this statement the court did reply to the men in regard to the wage question by offering an 8 per cent advance. The terms were:

1. That the men shall return to work.
2. That on their return to work their seniority and other privileges shall be restored to them.
3. That the pay increase sought—10 per cent over that of August, 1919, or 8 per cent over the current wage—shall immediately apply.
4. That the employees shall have the right to collective bargaining fully assured to them.
5. That the employees shall be assured of free and full opportunity to select representatives of their own choice to deal directly with the management.

These conditions were stated in a letter to Mayor Hylan in which the court said:

> I would be recreant to my obvious duty to the people of this community if I should again place their vital interests, involved, as they are in this transportation system, at the mercy of an association that has proved itself faithless to its obligations and irresponsible in its conduct. I cannot, therefore, consistently with my firm conviction of my duty, permit negotiations or agreements, directly or indirectly, now or hereafter, with this association; and, of course, I cannot bargain with this association as to terms upon which the strike may be ended.

A meeting of the men was called to consider the matter. Mr. Fridiger, counsel for the union, after reading the court's letter said:

> This proposition will never be put before you for a vote, unless it is put to you as members of the Amalgamated Association. I read this because I wanted the news to go out to the world that we had read the proposition, but refused to put it to you.

An emphatic "No!" was the answer to Mr. Fridiger's inquiry as to whether those at the meeting wanted to hear any proposal from Judge Mayer unless it was addressed to the Amalgamated.

In spite of the very plain statement made by the court, William D. Mahon, international president of the Amalgamated, who arrived in New York on Sept. 5, continued his effort through an appeal to public officials to seek a settlement. In a strict sense the strike was not an outlaw strike, because the Amalgamated, through Mr. Mahon, cast its lot with the men, although he did rebuke those on his side who had injured their own cause by criticising the court. In many respects Mr. Mahon's statement is very unusual. It follows substantially in full:

> My coming to New York at this time is to see if it not possible to bring together the contending forces and secure a settlement of the strike now in force upon the Brooklyn Rapid Transit lines. It was impossible for me to reach this situation sooner on account of the meeting of the general executive board of our association and the work it placed in my hands.
>
> This I sincerely regret, as it is most difficult for one to assume charge of a matter of this kind, especially after much bitterness has been engendered by actions and words spoken by those who do not understand the circumstances or represent the policies of our association. But the creation of this unpleasant condition was not with my consent or of my making.
>
> Therefore it is my hope that after the matter has been fully gone over we may be able to reach an honorable and satisfactory adjustment.
>
> I am advised that the railway company is represented by Judge Julius M. Mayer and Receiver Lindley M. Garrison. They are both broadminded and men of large affairs.
>
> Then I am advised that Governor Smith and Mayor Hylan have been working hard to bring out an honorable adjustment. It seems to me that with all these big public spirited men we ought to be able to gain a speedy settlement of this unpleasant affair. So far as the Amalgamated Association is concerned we only want justice and a fair deal.
>
> We are not here to villify Judge Mayer or to abuse the receiver, the authorities or the newspapers. I fully appreciate Judge Mayer's position. He represents the court, which always has my respect. My years of experience with electric railway affairs have taught me to know of the many difficulties and trying positions that both the court and the receiver must face in handling roads under such circumstances.
>
> The court necessarily must represent all parties and you can rest assured that those who have criticised the court in this case were not speaking for me or the Amalgamated Association.
>
> In such negotiations, if any, that will take place I shall personally represent the Amalgamated Association and its policy.
>
> This is no time to permit anything foreign to the issue at stake to interfere with a just and speedy settlement, and I take this means of appealing to the court, the receiver, the press and the public to unite in bringing the interested parties together and establishing permanent peace.
>
> It is my intention to call tomorrow on Mayor Hylan and take up the work through him with the hope of bringing about a settlement as above suggested.

So far as the matter of wages of the men who struck is concerned they compare very favorably with those paid for similar work elsewhere. Under the demands made by the men the company would have been called upon to pay out in wages more than its gross receipts. It was because of the peculiar relationship which existed under the receivership that the court insisted it should retain the right to review the arbitration findings with respect to wages. Taking the classes of employees which struck, namely the trainmen on the subway, elevated and surface, excepting the motormen on the subway and elevated, the company has pointed out the facts as follows:

> The minimum pay of a guard on the elevated and subway is $1,450 a year, and his maximum, obtained after eighteen months of service, is $1,560 per annum. Similar figures for the conductors on the elevated and subway are $1,750 minimum and $1,840 maximum.
>
> The conductors and motormen on the surface are paid a minimum of $1,650 a year and after three years a maximum of $1,950 per annum.
>
> All of these, of course, are for men working full time, which means six days a week.
>
> It is the identical wage paid to the following number of men in similar lines of employment by the following companies:
>
> 4558 by the Interborough Rapid Transit:
> 1494 by the New York Railways.
> 2044 by the Third Avenue Railway.
>
> The other surface railroad companies in the greater city either pay their numerous employees similar wages or less.
>
> Taking other lines of employment and without emphasizing the greater physical and mental requirements thereof, we find that the wages paid by us contrast very favorably therewith.
>
> The 12,467 hard working and faithful letter-carriers and post office clerks in Manhattan, Brooklyn and the Bronx receive a minimum of $1,400 a year, and after five years a maximum of $1,800 a year.
>
> The 3,758 firemen of our exceptionally fine fire department receive a minimum of $1,769 per year and after three years a maximum of $2,280, and our unexcelled police department pays its 9,229 patrolmen a minimum of $1,769 per annum, and after five years a maximum of $2,280.
>
> Hundreds of thousands of men and women doing clerical or physical work receive no more and in very many cases less than are paid by us as above set forth.

The attitude of the company with respect to the strike was made plain in a statement made by Mr. Garrison on Sept. 9. Except for the comparison of wages which it included this statement follows in full:

> The first phase of the strike is over. It ended with the final position taken by Mr. Mahon, international president of the Amalgamated Association. This association has a great stake in this situation. If its spokesmen are accurate, it had 12,000 members in the Brooklyn locals paying dues to the association of $1 a month each, making a total of $144,000 a year income to the association.
>
> If upon his arrival from the headquarters of this organization in Detroit, Mr. Mahon had thrust aside the radical leadership, repudiated the unwarranted breach of contract, disciplined the locals for violating the essential laws of their organization and ordered the men—who never should have left their work—to return to their work, he would have gone a long way toward showing that it was a body fit to be trusted.
>
> Instead of pursuing such a course, he contented himself with rebuking those of his subordinates who had injured their own cause in public esteem by general vilification and abuse—expressing regret at what he termed the "impatience" of these radical leaders and then casting his lot with them, making their cause his and that of his organization, and thereupon advising the former employees to refuse to return to work. With the disappearance of Mr. Mahon as a possible factor for good the first phase came to an end.
>
> The second phase is now being entered. It is the slow and laborious process of obtaining and training new men as a permanent force, for the proper and efficient operation of the system. This calls for much hard work on behalf of the management and much patience on behalf of the public.
>
> The work of obtaining the new men will be difficult, but the outlook is very hopeful. Despite whatever has been said upon the subject this employment is by no means ill paid, and considering the ratio of income to outgo is very well paid. And it must be borne in mind that the base of income is strictly limited by law while the necessary expenses are not.
>
> The court and the receiver have no personal or private interests to serve and therefore have every reason to be perfectly fair, reasonable and frank in all their dealings with the employees, and have always been fair and square with them and intend so to continue.

Maine's Municipal Marvel

Town of Turner Runs One-Car Line for Benefit of Summer Folks —Freight Handled

"Good service—clean cars," is the slogan of a little town in Maine, which has the distinction of being the first municipal owner and operator of an electric railway in the entire State and the second in all New England. Turner, a town of 2,000 people, won't be relegated to the woods, but wants to be in direct communication with Auburn and Lewiston and so enjoy the benefits of modern utilities.

The history of the Turner railway route though very brief is interesting in so far as it reflects the life of a townspeople who want to know and be known. The electric line in this section has been a "goat-getter" for years because of the inability to make it a paying investment. The old Auburn-Turner line was abandoned by an operating company and A. L. Kavanaugh of Lewiston as receiver, operated it for a while with a fairly successful showing. Later it was sold to the A. L. & W., now defunct, and up to last October, "intermittent" service was maintained. Then for the second time operation was abandoned, but even this failure didn't bring discouragement. In other words, you couldn't Turn-er down. Generally speaking, "nothing succeeds like success," but in Turner's case nothing succeeded like failure. With courage and determination the townspeople applied to the Legislature in November, 1919, and through their representative permission was granted to Turner to own and operate its own railway.

And now for several months Turner has been railroading—and enjoying the profits (profits, they really are, according to the manager). The only cloud to mar the happiness of the sturdy New Englanders is the thought of next winter when nature in the role of "Frankenstein," sends a monster who with ice and snow plays havoc and brings destruction to railway properties. Then the solitary car may get snowed under. Meanwhile, the tune is "In the Good Old Summer Time."

Right to Dismiss Union Men Upheld

A decision which is expected to have a far-reaching effect has been handed down by the Supreme Court of the District of Columbia in denying an injunction to members of the Brotherhood of Railroad Trainmen against the Washington & Old Dominion Interurban Railway. The injunction sought to prevent the discharge of employees who affiliated with the union. An extract from the opinion is as follows:

> Strikes that are conducted in an orderly manner and do not involve a violation of property rights or the production of public disorder are but the exercise of a right to work.
>
> The right to labor is a personal right which inheres in the individual and, as a corollary to that, the right not to work must be equally recognized. But with the recognition of these rights, there is another right which belongs to the employer and that right is one to impose conditions upon those who seek employment from a given employer, be that employer an individual or a corporation.
>
> It may be asked what becomes of the right of the employees to organize if, as a consequence of doing so, the employer may exercise his right as recognized by the United States Supreme Court. The answer may not be as easy to formulate, but this court is not called upon to answer the question. Its duty is to give effect to the authoritative opinions and decisions of the supreme tribunal, which give the company the right to dismiss its employees if they join a labor union.

Ontario Board Approves One-Man Cars

Discussing the one-man cars for electric railways, Vice Chairman A. B. Ingram, of the Ontario Railway Board at Toronto, Ont., on Aug. 13, stated that the cars had the unqualified approval of the board as an efficient means of eliminating expense in connection with railway operations. He is quoted as follows:

> They have been found very satisfactory and in several small places have gone far in cutting operating deficits. One-man cars of the approved type are now running in St. Thomas, Cornwall, Guelph, Port Arthur and Calgary. They are giving much more frequent service and in addition to the lessened cost of operating, they are much easier on the rail.
>
> The board approves of the one-man cars for the Toronto civic line and believes that they will be a success. If they were forced to cross railway tracks precautionary measures against accidents would have to be taken.
>
> Almost every one of the lines in the smaller cities is operated at a deficit. The Guelph line, which is municipally owned, had a deficit of something like $12,000. The one-man car in such places cuts the operating expenses almost in half.

Nashville Strike Broken

For the purpose of discussing the differences between striking trainmen and officials of the Nashville Railway & Light Company, Nashville, Tenn., union leaders and workmen conferred on Aug. 27 with Governor Roberts and Mayor William Gupton. No officials of the company attended the meeting.

The conference was held at the request of Fred L. Feick, of Washington, D. C., who is said to have represented himself as being from the Department of Labor. During the conference the strikers submitted their proposed contract as a basis for negotiations with the railway officials. Later during the afternoon B. C. Edgar, vice-president of the Nashville Railway & Light Company, consulted with the Governor.

Mr. Edgar stated that the strike had been called by the employees without notice to the company and without previous effort to arbitrate their differences. He further told the Governor that the company had the situation well in hand, that the men were returning to work, and that the company was satisfied with conditions. He said:

> Many of the striking employees have already come back to the company, and many of them have been reemployed at their old rates of pay. The company will continue to reemploy the good men who apply at their old rates of wages until 6 p.m. Sept. 2, after which all men employed will be employed as new men at the rate of wages applying to new men.

For the first time since the strike began, cars were operated in Nashville after 6 p.m., on Aug. 30.

Governor May Act

Buffalo Labor Situation Appears Deadlocked Over Retroactive Pay Features

Governor Alfred E. Smith probably will have to act personally if he hopes to establish a basis for arbitration of the wage question which is in dispute between the International Railway, Buffalo, N. Y., and its employees. This became evident on Sept. 4 when Herbert G. Tulley, president of the railway, failed to submit the proposition which Lieutenant Governor Harry C. Walker said had been agreed upon after a long conference on Sept. 3.

Lieutenant Governor Walker is chairman of the Governor's labor board which made a searching inquiry into the finances of the company and the grievances between the employees and the company. Concessions were made at the conference by the company's employees as represented by the Amalgamated and President Tulley on behalf of the company made concessions and it was believed an agreement would be reached.

The proposition in question involves the solution of the problem as to when a wage award granted by arbitration should become effective. Lieutenant Governor Walker worked out a plan which, he said, should meet with the satisfaction of both factions. Failure on the part of President Tulley to continue his part in the negotiations is characterized by the Governor's representative as "dodging the issue."

In a letter to Mr. Walker, President Tulley says the company agrees to let the Governor name the third arbitrator, but with the expressed condition that any further increase in wages can only be effective when a further increase in fares is granted. President Tulley says the men are receiving the same scale of wages as in Rochester and Syracuse where living conditions are comparable. Henry W. Killeen, of counsel for the International, says no further wage increases will be granted until after the state utilities board acts favorably upon a higher fare for the Buffalo traction lines.

Kansas City Railway's Champions

Looked at from the standpoint of promoting good fellowship among the employees and a spirit of co-operation the new ball park of the Kansas City (Mo.) Railways at Thirty-first and Askew Streets has already paid for itself twice over. The games are played Tuesdays, Thursdays and Saturdays in the Railways League, made up of six teams from the employees. On Sundays the "Tramways," the railway team in the Inter-City League, has challenged all comers with great success, leading the league now with six games won and one lost. E. B. Sanders of the company said:

> The majority of our employees are young men and much interested in baseball and the results have been wonderful for the company. The crowds on Sundays run between 500 and 1,000. The receipts go

> to the league. In addition to this the Employees' Brotherhood publishes a weekly newspaper known as the *Railway Athlete*, which gives the news of all the games as well as the standings of teams and batting averages. We feel that the very great success that has attended the undertaking more than compensates for the amount of money expended to put it on its feet and makes it a practical investment, paying weekly dividends in increased efficiency and interest.

The "Yankees," composed of employees from the Ninth and Brighton roundhouse, are leading the Railways League at present. There is a shop team and a power plant team in the league. The entrance of men from these fields engenders a considerable amount of healthy competition.

D. U. R. Denied Injunction

Railway Company May Carry Appeal Against City to the Supreme Court

Two suits brought by the Detroit (Mich.) United Railway to determine to what extent the city can legally use taxpayers' money in the construction of street railway lines have been dismissed by Judge Mandell in the Circuit Court. The Judge declined to issue injunctions asked by the D. U. R. restraining the city from using the Sinking Fund Commission's funds for purchasing municipal railway bonds, and restraining John A. Mercier, contractor for the Charlevoix Avenue line foundations, from building with the money obtained from the sale of the bonds thus sold.

In dismissing the suits Judge Mandell upheld the city's actions and sustained the opinion of Corporation Counsel Wilcox that it was not only the Sinking Fund Commission's right but its duty to buy such bonds, adding that if it had not been the proper course to follow, such action relative to the buying of Water Board bonds for the past fourteen years would have been stopped long ago. It is reported that the company will appeal the case to the higher courts.

The company contends that the Sinking Fund and the unexpended balances have not been the only funds used by the city to pay the bills of the municipal ownership project. It is stated that back in 1919 there was an appropriation of $100,000 out of the taxes for the use of the Street Railway Commission, then engaged in investigating the local traction problem, making appraisals of the company's property, studying subway possibilities, etc. On the witness stand the Comptroller testified that more than $8,000 of this appropriation collected in the July, 1919, taxes, was available for the present plans of the commission.

Corporation Counsel Wilcox has furnished the commission with an opinion that the City Council or the commission cannot change the routings of the municipal system from those voted on when the $15,000,000 bond issue was passed. At the same time he declared that the commission could build the Elizabeth-Witheral loop on the theory that it would be a turnout for the Woodward line also mentioned in the bonding proposition although the loop itself is not specified.

Mr. McCulloch Exonerated

Charges Against United Railways Head Growing Out of Loss of Referendum Petitions Dismissed

Richard McCulloch, president of the United Railways of St. Louis and first vice-president of the American Electric Railway Association, has been exonerated of all charges growing out of the loss more than two years ago of referendum petitions on a city ordinance affecting the United Railways. The case of Bruce Cameron, formerly superintendent of transportation of the company, has not yet been called, but it is understood that the Circuit Attorney will ask that it be dismissed.

HISTORY OF CASE

The case against Mr. McCulloch was sent to Springfield, Mo., for trial. On Aug. 30 it was called and, a severance being taken, the Circuit Attorney elected to try Mr. McCulloch first. The State put in all its evidence, and on Sept. 7 the Judge sustained a demurrer and ordered the jury to bring in a verdict for the defendant. All the better element of the city of St. Louis has been with Mr. McCulloch in what they considered persecution by corporation baiters, and since his vindication he has been in receipt of hundreds of letters, telegrams and messages of congratulation.

In June, 1918, referendum petitions on an ordinance affecting the United Railways were stolen from a safe in the Cigarmakers' Union, where they were temporarily stored before being filed. The theft was traced to a former employee of the company by the name of Jackson, who had worked as special agent under the superintendent of transportation. After about two weeks, Jackson returned to St. Louis, gave himself up, and offered to turn State's evidence on a promise of immunity from prosecution. He stated that he had been instructed to steal the referendum petitions by Mr. Cameron, under whom he had formerly worked, and on his testimony and that of another special agent by the name of Brady, and under strong pressure from newspapers hostile to the company, Mr. Cameron was indicted for burglary in July, 1918.

MR. CAMERON'S CASE STILL PENDING

It was thought at the time that the theft of the petitions was due to overzealousness on the part of Jackson in his capacity as special agent, but it has since been pretty thoroughly proved that the theft was a scheme of Jackson and others to extort money from the officials of the railway. Conditions were further accentuated by the fact that the Mayor and the Board of Aldermen who had passed the ordinance were Republican in politics, while the Circuit Attorney was a Democrat and was backed by two newspapers which had bitterly opposed the passage of the new franchise ordinance.

Mr. Cameron's case was sent out of the city on a change of venue and was still pending when the United Railways went into the hands of a receiver on April 11, 1919. In testimony before the Special Master in the receivership case in June, 1919, one of the attorneys used Jackson and Brady as witnesses to prove mismanagement, and this time a year after their former statements, Jackson and Brady testified that Mr. McCulloch, as well as Mr. Cameron, had told them to get the petitions at any cost. This testimony created great public excitement and although it was well known that the testimony of Jackson and Brady differed from that given a year previous, the Circuit Attorney, with the help of hostile newspapers, was able to procure an indictment for burglary against Mr. McCulloch. He also took advantage of the opportunity to reindict Mr. Cameron.

In order not to embarass the receiver, Mr. McCulloch immediately resigned as manager for the receiver, but has continued to serve as president of the company, as the board of directors refused to accept his resignation.

Place of Bus Recognized

Public Service Commissioner Returning from Abroad Believes Buses May Replace Some Railways

Lewis Nixon, Public Service Commissioner for the First District of New York, is convinced that buses are a good thing, but that they should not be run on highways already occupied by electric railways. Mr. Nixon has recently returned from abroad where he went to inquire into the question of bus transportation and to acquire first hand information relative to the advisability of such service in New York City.

BUSES A GOOD THING

His ideas with respect to buses were expressed to the ELECTRIC RAILWAY JOURNAL through confirmation by him of general statements made by the daily newspapers on Mr. Nixon's return. He said:

> One of the strongest impressions I got abroad is that hit or miss legislation must be avoided. I am convinced that buses are a good thing, but they should not be run on highways already occupied by street railways. In many ways buses can do good work. But if they are to be permitted to enter seriously as a factor of transportation, it should be under the most definite regulations and not under a guerilla system as they are running now. The bus drivers in this city are doing about as they please.
>
> Recently there was a report on traffic made in the House of Commons. I read it carefully and noted that the very flexibility which permits omnibuses to run out from stopping places out of their proper order and to meander and move sideways on the roads and to be driven two abreast, is in many cases a material element in road congestion. Flexibility implies taking advantage of chances of passing other vehicles, and though it may be an advantage for speed as against other competitors it is not without its element of danger.
>
> However, I am not and never have been against buses, and I believe they may eventually take the places of some street railways. But we cannot scrap a street railway line because some one considers a bus service superior.

Financial and Corporate

Rhode Island Securities Sold

New Haven Railroad's Investment of $24,000,000 Brought $2,200 Under the Hammer

Stock of the Rhode Island Company, Providence, R. I., and the stock and bonds of the Sea View Railroad were sold at public auction on Sept. 3 under orders of the Federal receivers by authority of a decree of the United States District Court for the Southern District of New York. Harry Parsons Cross bought all the stock of the Rhode Island Company, 96,855 shares, for $2,200. Mr. Cross also bid in for $200 the 7,000 shares of stock of the Sea View Railroad. Nathaniel Terry Bacon of Peace Dale, president of the Narragansett Pier Railroad, bought the $600,000 gold bonds of the Sea View for $1,400. It is understood that after the auction Mr. Bacon purchased from Mr. Cross the Sea View stock he had bid in for $200.

MR. SHERMAN A PURCHASER

Duff F. Sherman bought the Providence & Danielson Railway at private sale for $100,000. By agreement, the receivers will operate the road until Oct. 2, Mr. Sherman guaranteeing any deficit.

The 96,855 shares of Rhode Island Company stock which Mr. Cross bought for $2,200 represent an original investment by the New York, New Haven & Hartford Railroad of $19,000,000, which was further increased to $24,000,000. In addition the New Haven loaned $4,000,000 to the Rhode Island Company for improvements and other requirements, against which it took notes of the Rhode Island Company. These notes are still held by the New Haven Company.

RHODE ISLAND ASSETS STATED

Among the assets of the Rhode Island Company are the Woonsocket and Burrillville roads, which with other property holdings are in the hands of receivers. Another asset is over $2,000,000 stock of the United Traction Company, which stock was pledged by the Rhode Island Company to secure bank loans. There are also parcels of real estate, cars and other items, the value of all its physical assets being estimated at about $5,000,000. Against all assets are claims said to aggregate $10,000,000, which accounts for the nominal price brought at the sale of the stock.

No information as to the outlook of the Sea View, the Danielson and the Chepachet lines could be obtained from the successful bidders, except that Mr. Sherman expects to run his properties until Oct. 2 by agreement with the receivers, a guarantee covering deficits being given. As to the Sea View, the purchasers have nothing whatever to say.

The properties sold are subject to liens, which are in some instances problematical and must be adjudicated by the courts.

The stock and bonds of the roads involved were sold, and not the physical properties. The sale in no way affects the several lines leased by the Rhode Island Company, including the Rhode Island Suburban, Union Railroad lines in this city, Pawtucket, East Providence, Buttonwoods, East Greenwich, Pawtucket Valley, Cumberland Hill and lines to Attleboro.

Philadelphia Appraisal to Continue

An order to continue the appraisal of the property of the Philadelphia Rapid Transit Company has been made by the Public Service Commission meeting in special executive session at the City Hall. The commission allowed the withdrawal of the no-transfer higher fare tariff presented by the company on June 1 and in doing so reaffirmed its order of July 26, that there could be no fare increase until the company had completed the valuation of its property and presented it to the city and commission.

Evidence produced at hearings in July failed to convince the commission that the proposed increase was warranted and the order declared imperative until a valuation had been submitted by the company. Recently the company asked the commission for permission to withdraw the no-transfer tariff. The city, while assenting to the withdrawal plan, asked the commission to order the valuation proceedings continued. An appropriation of $50,000 was voted by Council for the employment of experts by the city, to check up the appraisal when it should be presented to the commission.

The text of the order drawn by James S. Benn, Philadelphia member of the commission, follows:

> The petition of the Philadelphia Rapid Transit Company to withdraw Tariff P. S. C. Pa. No. 68, and the petition of the city of Philadelphia waiving objection to the withdrawal of said tariff are hereby granted. This permission is without prejudice to the pending complaints of the Cliveden Improvement Association et al. against the rates and service of the respondent company, which were in part merged with the complaint against said tariff schedule, and the same are hereby restored to their former status on the docket of the commission.
>
> The order of the commission of July 26, 1920, in so far as it relates to the preparation and submission of an inventory and appraisal of the respondent is hereby affirmed, a copy of said inventory and appraisal to be furnished to the city of Philadelphia and every opportunity given it to check up the same and present such evidence in relation thereto as it may deem proper.

Another Buffalo Committee

Appeal to Security Holders to Oppose Plan of Committee Headed by McDougal Interests

Bondholders of the International Traction Company, Buffalo, N. Y., have organized a new committee in opposition to the proposed plan of reorganization of the Buffalo traction system submitted last month by Elliott C. McDougal, chairman of the bondholders' protective committee. The protesting bondholders charge the arrangement is not equitable. Before the objections to the adoption of the reorganization agreement can become effective, proxies or co-operation of persons owning 30 per cent or about $17,000,000 in securities must be obtained. To date the committee represents $1,534,000 in deposited bonds.

PHILADELPHIANS ON COMMITTEE

Three Philadelphia men who organized the committee are George K. Reilly, a banker; J. M. Johnston and R. M. Stinson, dealers in investment bonds. One of the reasons enumerated why holders of the certificates of deposit for collateral 4 per cent trust bonds of the International Railway should object to the plan promulgated by Mr. McDougal is that the voting trust proposed would perpetuate for its term of five years "the management which declined to put in operation a fare increase from 5 to 7 cents for five months after it was granted to the company." It also is claimed that the company has $1,500,000 in its treasury and that the protective committee has $400,000 on hand. The objecting boldholders say:

> The $1,800,000 cash planned to be raised by forcing you to purchase 9½ shares of voting trust certificates to provide for capital expenditures over 1921 is extremely drastic and premature.

It also is charged that the International Railway is not at present on the verge of bankruptcy, "but we are advised," the committee says, "the company will earn during 1920 over and above all fixed charges at the rate of $400,000 a year, and such figures are arrived at after setting aside $2,700,000 for maintenance and accident claims."

The Guaranty Trust Company, New York, N. Y., is the depository for the bonds of the protesting committee.

REASONS FOR OBJECTIONS SUMMARIZED

The committee, of which George K. Reilly, of Reilly, Brock & Company, Philadelphia, is a member, in addressing the security holders, has summarized its reasons why holders should object to the plan of Aug. 17 as follows:

> 1. The company has $1,500,000 cash in its treasury. The protective committee has $400,000 cash on hand.
> 2. The bonds of the International Railway bought in for you have an estimated value of nearly $2,700,000.
> 3. You are asked to give up title and rights in $640,500 of underlying bonds, and $200,000 of 7 per cent notes (including the values mentioned in paragraph 2).
> 4. The International Railway common stock is your property.
> 5. The 7-cent fare put in operation

April-May, 1920, should continue to yield additional revenues.

6. The $1,800,000 cash planned to be raised by forcing you to purchase 9½ shares of voting trust certificates to provide for capital expenditures over 1921 is extremely drastic and premature.

7. A voting trust such as is proposed would perpetuate for its term the management which declined to put in operation a fare increase from 5 cents to 7 cents for five months after it was granted the company.

8. The plan is unjust to bondholders who are unable or unwilling to subscribe, since they lose their entire investment.

Experts Criticise P. R. T. Depreciation Plan

Lybrand, Ross Brothers & Montgomery, public accountants, have reported for 1919 to the city of Philadelphia on the finances of the Philadelphia Rapid Transit Company under the terms of the operating agreement of 1907. Unofficial summaries of the report indicate that the company on Jan. 1, 1919, abandoned its practice of deducting annually from its gross revenues 15 per cent for renewals and upkeep.

As of Jan. 1, 1920, the renewal reserve appears to have dwindled to $574,470. Out of the surplus in the reserve renewal fund of $1,127,320, the company applied $552,200 for maintenance of way and structures and for equipment and cars. In commenting on the report the Philadelphia *Record* says that "had proper deductions been made from gross earnings by the Rapid Transit Company for renewals during 1919, the company would not have been able to show a net profit sufficient to pay the annual dividend of 5 per cent or $1,500,000 on its $30,000,000 capital. Not until June of this year did the company pass up a dividend, and that was for the first six months of 1920."

The report comments as follows:

> Previous to Jan. 1, 1919, the accounting officers of the company maintained that the charge against operation of 15 per cent of the gross revenues was sufficient to cover current maintenance and to provide a reserve from which replacements, necessitated by depreciation and obsolescence, could be made. The officers now state that the company has entered upon an era of operation, by which the property is maintained at a high standard of efficiency, which makes unnecessary, in a cycle of years, any provisions for depreciation or obsolescence.
>
> It is our opinion that the cost of renewals, which are inevitable, should be provided for from the operations of the years during which the property is in use, and not be borne by the years subsequent to its retirement or replacement. Furthermore, the policy adopted by the company is liable to abuse and is only defensible if the principle of keeping the road up to its greatest efficiency is rigidly adhered to.

Washington Lines Go Behind

It is reported that the rate of 8 cents for cash fares or four tickets for 30 cents which was put into effect last May on the lines of the Washington Railway & Electric Company, Washington, D. C., is not providing a fair return on the valuation of the company. Indications are now that on the current year the revenues of the company will fall short by $450,000 of the amount necessary to allow a 6 per cent return on the property. The higher rate was authorized by the Public Utilities Commission of the District of Columbia.

Glasgow Has First Deficit

Previous Years of Profit, Which Allowed $997,238 to Be Paid to the Common Good, Now Changed to Deficit

After having completed the repayment of its capital in 1917, thereby eliminating interest and sinking fund charges, the accounts of the Glasgow Corporation Tramway for the year ended May 31, 1920, show a deficit—the first in the history of the tramway under municipal control. The working expenses have been continually rising and this year overtook the receipts, leaving a deficit of £108,531. One of the reasons for this decrease in the last two years has been the increase in 1919 from £400 to £700 per mile of single track in the rate of depreciation of the permanent way. This railway is noted for its ability to allow such a large percentage of its passengers to travel for the equivalent of 1 cent.

THE results for the year show that the ordinary income amounted to £1,721,578 and the working expenses, including payments to dependents of employees serving with his Majesty's forces, to £1,558,161, thus leaving a net revenue of £163,417. The ordinary income of the previous year was £1,531,320 and the working expenses £1,249,989, leaving a net revenue of £281,331. The decrease of 1920 over 1919 was £117,914, or 42 per cent. After paying the Paisley District Tramways Company, Ltd., income tax, parliamentary expenses, interest and sinking fund, and carrying a definite amount to the depreciation and permanent way renewals fund, there was a deficit for the year of £108,531. It will be noticed from the income statement that the gross

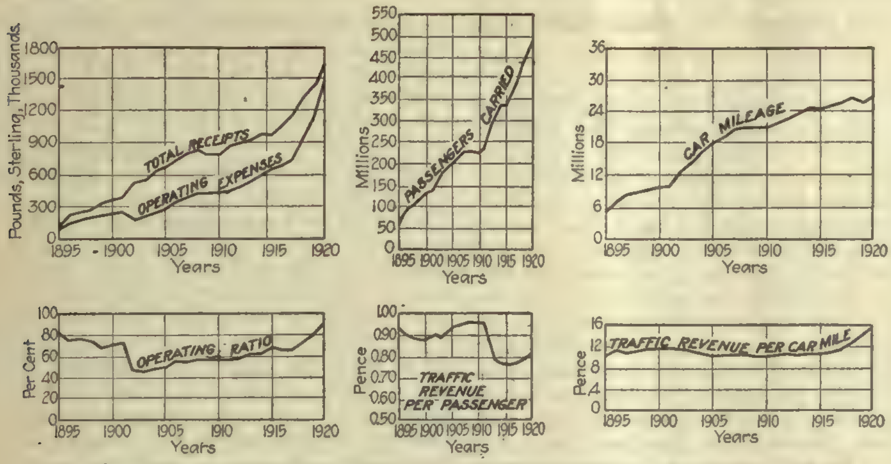
INCOME STATEMENT—GLASGOW CORPORATION TRAMWAYS

Year ended May 31:	1920	1919	Percentage Change
Revenue from transportation	£1,716,490	£1,527,487	+12.4
Revenue from other railway operations	5,087	3,832	+32.8
Total railway revenue	£1,721,577	£1,531,319	+12.4
Traffic expenses	856,111	674,167	+26.0
General expenses	225,872	175,005	+29.1
General repairs and maintenance	317,521	219,509	+44.7
Power expenses	152,742	106,686	+43.2
Clydebank bridges	2,314	1,752	+32.1
Total railway expenses (excluding depreciation)	£1,554,560	£1,177,119	+32.0
Net operating revenue	£167,017	£354,200	—52.8
Payment to dependents of employees serving with his Majesty's forces	3,601	72,869	—95.0
Balance carried to net revenue account	£163,416	£281,331	—42.0
Non-operating income	13,345	10,565	+26.3
Gross income	£176,761	£291,896	—39.5
Deductions from gross income:			
Proportion of traffic receipts due Paisley District Tramways Company, Ltd	110,092	9,755	+13.7
Interest on capital	3,892	....	.....
Sinking fund	1,715	....	.....
Property and income tax	81,296	83,702	— 2.9
Parliamentary expenses	1,056	123	.....
Depreciation fund	48,943	46,149	+ 6.1
Permanent way renewals fund	137,299	137,394	.....
Total deductions from gross income	£285,293	£277,123	+ 3.0
Net income transferred to profit and loss	*£108,531	£14,772	—835 0

* Deficit.

STATISTICAL INFORMATION—GLASGOW CORPORATION TRAMWAYS

Year ended May 31:	1920	1919	Percentage Change
Miles of single track	198.12	198.25	......
Total revenue car-miles	26,459,015	25,581,547	+ 3.4
Total revenue car-hours	3,528,207	3,413,371	+ 3.4
Ratio C.M. to C.H. (speed m.p.h.)	7.47	7.49	......
Revenue passengers, total	509,339,886	464,246,677	+ 9.7
Traffic revenue	£1,716,491	£1,527,488	+12.4
Average fare paid per passenger (pence)	0.809	0.790	+ 1.4
Traffic revenue per mile of single track	£8,664	£7,704	+12.5
Kw.-hr. (traction load and car lighting)	42,942,868	39,984,597	+ 7.4
Estimated population served (city and suburbs)	1,338,811	1,150,000	+16.4
Population served per mile of single track	6,757	5,800	+16.5
Average distance paid for per passenger (miles)	1.839	1.795	+ 2.5
Average traffic revenue per passenger (pence)	0.81	0.79	+ 2.5
Statistics per car-mile:			
Average traffic revenue (pence)	15.57	14.33	+ 8.7
Average total working expenses (pence)	15.71	11.40	+37.8
Average number of passengers	19.25	18.15	+ 6.1
Kw.-hr. (traction and car-lighting)	1.62	1.56	+ 3.8
Car-miles per revenue passengers	0.052	0.055	— 5.4
Car-miles per mile of single track	133,547	129,030	+ 3.5
Statistics per car-hour:			
Average traffic revenue (shillings)	9.72	8.96	+ 8.5
Average total working expenses	8.82	6.90	+27.8
Average number of passengers	144.0	136.0	+ 5.9
Operating ratio—per cent	90.3	76.8	+13.5
Rolling stock:			
Top covered cars	865	828	+ 4.5
Standard cars	30	30	.....
Converted horse cars	1	7	—86.0
Training car	1	1	......
Total cars in stock	897	866	+ 3.6
Average number of cars in use per day	741.53	667.98	+11.0



SIX CHARTS SHOWING STATISTICAL INFORMATION OF SEVEN ITEMS BETWEEN YEARS 1895 TO 1920 INCLUSIVE

Fare	Passengers Carried		Traffic Receipts	
	Number	Per Cent	Amount	Per Cent
½ d	304,865,756	59.86	£635,137	37.00
1 d	142,076,326	27.89	591,985	34.49
1½ d	37,989,011	7.46	237,431	13.83
2 d	12,394,898	2.43	103,291	6.02
2½ d	5,596,692	1.10	58,299	3.40
3 d. and upwards	6,417,203	1.26	90,047	5.24
Sundries	....	......	301	0.02
Totals	509,339,886	100.00	£1,716,491	100.00

revenue for the year shows an increase of £193,038 compared with 1919, and that the average traffic revenue per car-mile increased from 14.33 pence to 15.57 pence. This is very high considering that about 60 per cent of the total passengers carried pay only 1 cent per ride. The working expenses, excluding expenditure incurred on account of the war, showed an increase of £377,441, or 32 per cent.

TRAMWAY DEBT PAID

The total tramway debt of the company was paid off in 1917. Since that date new capital expenditure amounting to £45,143 has been incurred. The amount at the credit of the depreciation and permanent way renewals fund on May 31, 1919, was £449,006. A sum of £163,663 was deducted during the year to be expended on track renewal, etc. The amount added to the fund was £186,242, leaving the balance standing at £471,585.

Rates of depreciation and permanent way renewal as they now stand are: Permanent way allowed £700 per mile of single track, or £137,299; power station and substations plant, 3 per cent; cars, 5 per cent; electric equipment of cars, 5 per cent; other rolling stock, 15 per cent; Clydebank bridge, 5 per cent.

The total rolling stock for 1920 was 897 cars, as compared with 866 in 1919. Of this number, 429 are now fitted with vestibules. The work of building new cars is being pushed. During the year thirty-seven new cars were put into service.

LARGE PERCENTAGE PAY ONE CENT

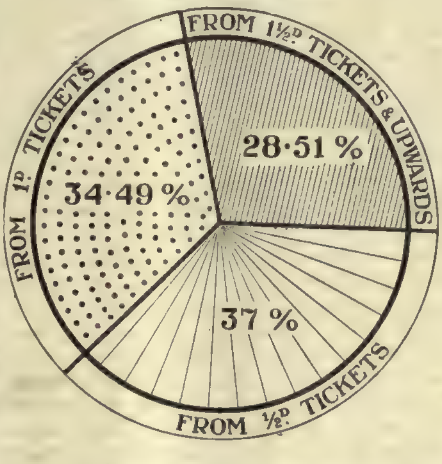
As noted before, the company charges about ½ penny (1 cent) as the fare of about 60 per cent of the passengers. The accompanying table gives the number of passengers carried during the year at each fare and the revenue from each fare, with percentages in each case. There were 304,865,756 passengers paying only ½ penny and the traffic receipts from this group amounted to 37 per cent of the total receipts.

On an eighth of a mile less of track and with a thirteen-hour day instead of fourteen hours both the car-miles and the car-hours increased 3.4 per cent.

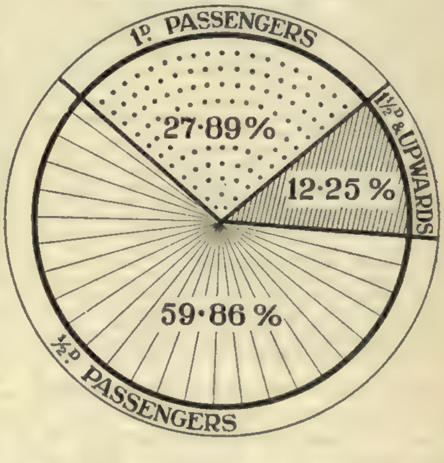
The company has to pay taxes the same as a private corporation and gives its profits to the common good. The total number of employees was 7,195 in 1920, an increase over 1919 of 540. Of this total for 1920, there were 1,784 motormen, 1,464 conductors and 467 conductresses. The change back from women to men operators may be noted by the fact that the conductors in 1919 were 800, while the conductresses were 1,087. The total payroll for the year 1920 was £1,129,909.

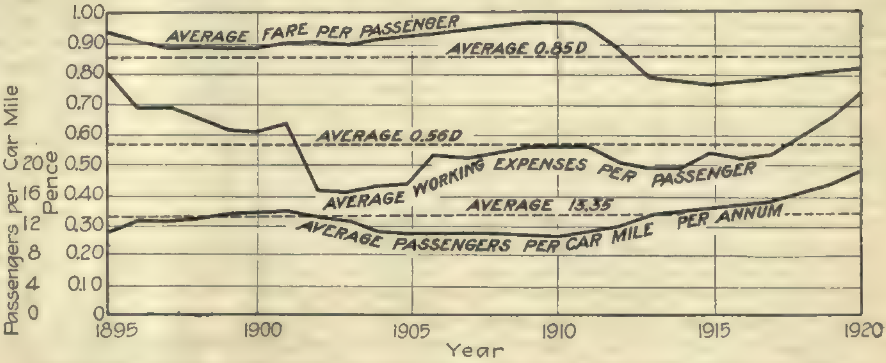
In the accompanying charts everything seems to be advancing at a tremendous pace. The operating expenses are nearly overtaking the total receipts, as seen by the fact that the operating ratio is now more than 90 per cent. But at the same time the passengers carried have increased, as has the traffic revenue per passenger. Car mileage, although decreased in 1919 by 679,684 over the previous year, shows an increase in 1920 over 1918 of 197,784, making the total car-miles 26,459,015 for the year. Traffic revenue per car-mile has increased uniformly since 1917. The average passengers per car-mile since 1895 were 13.35, but the last few years the number has been higher, reaching 19.25 in 1920. The average fare per passenger had a drop between 1911 and 1915, but is gradually gaining again. The maximum average on this curve was in 1910 with .96 pence and the minimum was in 1915 with .76 pence. For 1920 the average was .81 pence. At the same time the average working expenses per passenger are increasing at a more rapid rate. For 1920, the average working expenses per passenger was .73 pence.

TRAFFIC REVENUE



PASSENGERS CARRIED





AVERAGES OF THREE ITEMS FOR TWENTY-FIVE-YEAR PERIOD, 1895-1920

Ocean Shore Ceases Operation

The Ocean Shore Railroad, San Francisco, Cal., has ceased to operate. The road was never completed, there being a gap in the middle almost as long as the completed part of the road. Construction of the road was very expensive. The traffic was never sufficient to make the road pay, and recently the automobile and motor truck have cut into the road's revenues. Finally the 100 employees made demands for an increase in wages. At this point the officials threw up their hands in despair and discontinued operation.

Ten million dollars was spent in the effort to build and operate the road. After the stockholders had been wiped out a committee of bondholders struggled unvailingly for nine years to make the road pay. Yet the situation is not entirely without hope. The San Francisco terminals of the company are electrically operated. Rapid general development of the territory through which the road runs and the extension of electric propulsion to the entire line may possibly afford a way out.

Financial Plan Declared Operative

The protective committee representing the holders of the 4-6 per cent bonds of the National Properties Company, Philadelphia, Pa., of which Evan Randolph is chairman, has declared the amended plan operative. The time for the deposit of bonds, which expired on Aug. 16, has been extended to Sept. 20.

A second protective committee with V. Gilpin Robinson as chairman has taken this position:

1. That full information as to all operations of the American Railways and the National Properties Company since Jan. 1, 1916, shall be given to all bondholders.
2. That the present condition of their property as to resources and earning power shall be made clear.
3. That the provisions in the deed of trust securing the bondholders shall faithfully be carried out.
4. That all claims that may be justly found to lie against the National Properties Company, any other company, or any individuals shall be prosecuted to the full extent of the law for the benefit of the National Properties-American Railways bondholders.
5. That the plan which is finally presented to the bondholders be a plan that gives those bondholders who pay any assessment that may be necessary, the best possible security for their money, and a plan whereby those bondholders who cannot pay an assessment get a square deal.

Bondholders are requested to deposit their bonds with the Provident Life & Trust Company, Philadelphia, on or before Sept. 8. If deposited with the original protective committee, holders are asked, if they so wish, to withdraw their bonds and redeposit them.

The plan as originally proposed was intended to supply the company with additional cash and to take care of obligations which are in default. It was devised principally because it had become impossible satisfactorily to market the securities of the subsidiaries owing to the changed money conditions, especially as to interest rates. The details were referred to in the ELECTRIC RAILWAY JOURNAL for July 17, page 147, and Aug. 14, page 334.

City Opposes Renewal Fund Use

The special traction counsel for the city of Chicago, Chester E. Cleveland, has notified the Board of Supervising Engineers that it should not approve any certificates of expenditure for new equipment, which are to be covered by surplus money in the 1907 contract ordinance renewal fund. The use of such money for buying new cars was authorized by the Illinois Public Utilities Commission as explained in full in ELECTRIC RAILWAY JOURNAL of Aug. 14, page 337, and commented on editorially in the issue of Aug. 21, page 348. The city, in its notice, reminds the board members that they are bound by a contract between the traction companies and the city and that the use of the renewal fund money for buying new cars would be contrary to the provision of that contract. There is also an intimation that the city will resort to court action if the fund should be used in this manner.

Financial News Notes

Receiver's Certificates Retired.—Judge Faris in the United States District Court has issued an order permitting Rolla Wells, receiver of the United Railways, St. Louis, Mo., to pay out $2,300,000 of the company's general funds to retire $2,300,000 of 6 per cent receiver's certificates which fell due on Sept. 2, 1920. The order disclosed that the receiver had been unable to sell any of the $4,200,000 of receiver's certificates authorized by the court about six weeks ago, because the bids were too low.

Car Trust Certificates Offered.—Hambleton & Company and the Fidelity Trust Company of Baltimore, Md., recently offered at prices to yield 8 per cent $280,000 of 8 per cent car trust gold certificates, Series of 1920, of the Dallas (Tex.) Railway. The certificates are dated Sept. 1, 1920, and are due serially March 1, 1921, to Sept. 1, 1923. They are in the denomination of $1,000. Interest is payable May and September at the office of the Fidelity Trust Company, trustee. The certificates are redeemable as a whole on thirty days' notice at 101½ and interest. They are secured by fifty specially equipped new Birney safety cars built by the J. G. Brill Company, upon which the company will make an initial payment of about 20 per cent of the total cost.

Vote on Reorganization on Oct. 18.—With a view to consummating the amended plan of reorganization of the United Railroads, San Francisco, the stockholders of the Market Street Railway will vote on Oct. 18 on authorizing the new stock and bonds called for by the plan, thus increasing the total capital stock to $32,150,000 and the authorized debt to $22,700,000. The capital stock will be advanced from $18,750,000, all common, to $32,150,000, consisting of $11,750,000 of prior preference stock; $5,000,000 of preferred stock; $4,700,000 of second preferred stock and $10,700,000 of common stock. The stockholders will also vote on increasing the authorized bonded debt from $17,500,000 to $22,700,000 by authorizing the issuance of $5,200,000 of five year 6 per cent notes to be secured among other ways, by pledge of $5,200,000 of the present authorized bonds. The meeting will also act on increasing the number of directors of the corporation from five to eleven.

Dallas Still Far Behind.—The Dallas (Texas) Railway carried fewer passengers during July under the 6-cent fare than during May under the 5-cent fare, according to statistics given out recently by Richard Meriwether, vice-president and general manager of the company. During May 5,682,705 passengers were carried while during July only 4,976,398 passengers rode on the cars, a decrease of 706,307. The company, even with the 6-cent fare, is not earning the return authorized under the terms of the franchise granted on April 3, 1917. The shortage for the month of July amounted to $19,566. Mr. Meriwether's report shows a total valuation of $8,863,005 on which a return of 7 per cent is authorized by the franchise, thus giving a net return of $51,700. The gross income from all sources for July was $275,391, and the operating expenses $243,257, leaving net earnings of $32,134. This gives an accumulated shortage for the thirty-four months' operation under this franchise amounting to $566,790.

Receiver Named for Hamburg Railway.—John F. Burke, Buffalo, N. Y., was named receiver on Aug. 31 by Justice Alonzo Hinkley in Supreme Court for the Hamburg Railway Company, Buffalo, under $10,000 bond. The receivership order requires that the Public Service Commission be asked to determine what sum the company will be required to pay for power to operate its cars to the Buffalo & Lake Erie Traction Company's terminal at Bay View, N. Y., and what sum the Buffalo & Lake Erie Traction Company shall be required to pay for the use of 2 miles of the Hamburg line's tracks. Mr. Burke was the choice of the majority bondholders for receiver. He is a large bondholder. With the appointment of a receiver for the Hamburg Railway, which has been operated as part of the Buffalo & Lake Erie Traction Company system, the Buffalo & Lake Erie Traction Company was compelled on Sept. 1 to suspend local service over the Hamburg line. The receiver for the Hamburg line prohibits the Buffalo & Lake Erie Traction Company from making local stops between Buffalo and Bay View. The Buffalo & Lake Erie Traction Company operates between Buffalo and Erie, Pa.

Traffic and Transportation

Iowa Lines Raise Fares

Cedar Rapids and Mason City Companies Raise Rates Under Terms of Supreme Court Decision

Acting under the terms of a recent decision of the Iowa Supreme Court, two electric railways operating within the State have raised their fares. They are the Cedar Rapids & Marion City Railway, Cedar Rapids, whose rates are now 8 cents, and the Mason City & Clear Lake Railroad, Mason City, which is also charging an 8-cent cash fare.

The opinion of the Supreme Court was rendered in the case of the appeal of the Ottumwa Railway & Light Company, Ottumwa, from a ruling of the lower court which denied the company an injunction restraining the City of Ottumwa from reducing the fare from 6 cents to 5 cents. The higher court ruled that a contract between a city and a railway which fixes a permanent fare has never been sanctioned by the Legislature of Iowa, and that, therefore, rates fixed in such a contract may be changed. The court further held that it is against public policy to contract for unchanging rates and that there must be no such contract because its enforcement might fasten an exorbitant charge on the patrons, or on the other hand a rate that will confiscate the property of the utility.

COMPANIES QUICK TO ACT

This ruling of the court has been interpreted by the managements of several Iowa properties to mean that inasmuch as the rate of fare specified in a franchise is not binding, the companies have the right to put in force a rate of fare which is not unreasonably high. The order is further interpreted to mean that the rate of fare need not be one which just misses being confiscatory, but one which is reasonable, taking into account the cost of money to utilities. The decision is therefore regarded as of considerable importance to the electric railways of the State, since it apparently means that the companies will be able to maintain their properties and render adequate service.

The rate increases at Cedar Rapids and Mason City were made upon the companies' own initiative. It is reported that the higher fare went into effect in both cities without any friction or complaint from the public. The Cedar Rapids company announced that the wages of its 200 employees would immediately be advanced. The Iowa Railway & Light Company, which operates a few cars in local service in Cedar Rapids, also increased the fare to 8 cents.

A feature of the new Mason City rate is the sale by the company of a monthly ticket by the use of which it is possible to make each ride at a cost of as low as 6 cents. The tickets, or passes, are sold for $1 each and each is good for one month only. The plan is designed to take care of the steady rider. Each time the holder of a pass boards a car he shows the card and gives the conductor a nickel. At forty rides a month his fare is 7½ cents; at fifty rides, 7 cents; at sixty rides, 6⅔ cents; at seventy rides, 6.4 cents; at eighty rides, 6.2 cents; at ninety rides, 6.1 cents, and at 100 rides, 6 cents. The cards are issued to individuals and are not transferable. They are not issued to companies. Each card is stamped with the date of issuance and the holder's name.

Seven Cents in Oklahoma City

A 7-cent fare with four tickets for 25 cents took effect on the local lines of the Oklahoma Railway, Oklahoma City, Okla., on Sept. 10. The fare was formerly 5 cents. The new rates were authorized by the State Corporation Commission.

Some four or five months ago the officers of the Oklahoma (Okla.) Railway took up with the Mayor and City Commission of Oklahoma City in an informal way the matter of increased fares on the city lines. The situation was explained fully and about the middle of June a formal petition was presented to the commission asking for a 7-cent fare, four tickets for 25 cents.

The Mayor suggested that a committee of five men be appointed and an independent auditor be retained at the expense of the railway to investigate the finances of the company and report to the commission. This plan was agreed to by the railway and the committee and the auditor were appointed by the Mayor. The auditor went into the affairs of the railway very thoroughly and submitted a report early in August to the committee to the effect that the company was unable to function properly under the 5-cent fare with the universal transfers in effect since the company was organized.

After a thorough study of the report the committee voted to recommend the increase which had been requested. On the committee was a representative of the labor unions. This member voted under instructions from the labor council and was the only member of the committee to go on record against the increase. The Mayor and the City Commission, after going over the report, passed an ordinance permitting the provisions of the franchise which requires a 5-cent fare to be waived for three years and decided in favor of an increase in fares in accordance with the recommendations of the committee subject to the approval of the State Corporation Commission.

Losing $2,772 Daily

Kansas City Railways Tells Municipal Authorities It Must Have More Revenue—Asks Higher Rate

Service is being furnished by the Kansas City (Mo.) Railways at a daily loss of $2,772. This fact is brought out by the company in a letter which it has addressed to Mayor Cowgill and other municipal officials as well as to the Chamber of Commerce and the daily newspapers. In this communication the railway management outlines the reasons for its recent application to the State Public Service Commission for authority to raise its fare.

FLEXIBLE FARE PROPOSED

To meet the present situation the company proposes to install a flexible-fare system under which the rate, based on present prices, would advance from 8 cents to 9 cents, with six tickets for 50 cents. This would mean a rate of approximately 8.5 cents a passenger. The average fare is now 7.42 cents, while the cost of furnishing service is 8.23 cents for each revenue passenger.

Increases in wages and in the cost of fuel have been largely responsible for its present predicament, says the company. During the past year wages have risen by approximately $1,000,000, while the price of coal has advanced from $3.43 to $4.46 a ton. The company points out that for the period of March, April and May it operated at a loss of $255,056.

The company's letter follows in part:

> The street railway business is bottomed upon the theory that it will have a monopoly of the community's transportation. Upon this theory it is regulated and controlled by law, both as to its operation and its earnings. Upon this theory it is required to operate development service upon lines and in districts where present traffic does not pay the actual cost of operation. It is required to operate owl cars which are non-paying; to maintain certain service standards regardless of whether they pay.
>
> #### JITNEYS ADD TO COST
>
> We, of course, feel that the best interests of the Kansas Cities are not served by permitting the operation of jitneys. We do feel that the transportation of a city covering eighty-nine square miles, with a population of 450,000, and now served by 315 miles of street railway, can never be adequately furnished by this form of transportation. In the first place, if automobile transportation should attempt to furnish the service now given by the Kansas City Railways it would be an economic impossibility. . . .
>
> #### DIVIDENDS NOT ASKED
>
> In view of the facts as above set forth, and which are established by exhibits, or which can readily be ascertained from the city's representative on the Board of Control, we are asking for a fare that will make possible the present high grade of service; to pay adequate wages to our employees; and to pay a legal rate of return to those whose money is invested in Kansas City's street railway facilities. We are not asking for profits or dividends, nor do we expect them.
>
> We regret the necessity for this step and would welcome any condition that would make possible a reduction in car fares. We submit for your consideration the fact that the removal of jitney competition and the reestablishment of the transportation business of Kansas City upon the proper basis would make possible a reduction under what will otherwise have to be charged. Wo do not believe that it is just or for the best interests of Kansas City that the 350,000 people who daily avail themselves of our service should be required to pay a penalty of approximately 1 cent a car ride in order to supply jitney service to a small minority.

Bridgeport Cars to Run Again

Connecticut Company Plans to Restore Service on Its Lines There on Sept. 20, Following Council's Action in Restricting Buses

Bridgeport's electric cars are "coming back." Service will be restored by the Connecticut Company on its Bridgeport city division on Sept. 20. Announcement to this effect was made by Lucius S. Storrs, president of the railway, on Sept. 8 following the action of the Bridgeport Common Council the evening before in passing a new ordinance ruling motor buses off the principal streets served by the railway. The resumption of trolley operation will end a "vacation" lasting nearly two months, during which Bridgeporters have been dependent for transportation upon jitneys or private automobiles.

THE measure passed by the Council on Sept. 7 restricts jitney operation to certain designated streets and to districts for the most part entirely without electric railway facilities. Bus competition with the railway is halted through the elimination of the "jits" from the central section of the city. There is, however, no attempt to do away with the buses entirely. In the future the jitneys are to furnish a service complementary to the railway.

ENDS EIGHT WEEKS TIEUP

The resumption of trolley service in Bridgeport will come just eight weeks after the cars were taken off the streets because of the Council's failure to regulate the buses. A previous ordinance, which would have meant the elimination of all jitney operation, was declared invalid by Judge Banks on July 22 because it delegated the Council's power to fix routes to the board of police commissioners. The Council took no action to enact a new ordinance along the lines indicated by Judge Banks. The company therefore ceased operation on Aug. 2.

Under the provisions of the new law five routes are specified which the buses will be required to follow. Several of these routes traverse the city from east to west, largely through streets not having trolley tracks. A penalty of $100 is provided for each violation of the ordinance. Those sections of the measure with "teeth" follow:

> Section 2: No person, firm or corporation shall operate a public service motor vehicle along any other streets than those established and fixed in this ordinance as traffic routes.
>
> Section 3: Any person, firm or corporation violating any of the provisions of this ordinance shall pay a fine of not more than $100 for each offense.
>
> This ordinance shall take effect September 20, 1920.

PRESIDENT STORRS SATISFIED

After studying the ordinance as passed, President Storrs announced that it was satisfactory to the company and that the company would resume operation in Bridgeport on Sept. 20, the day on which the new statute will take effect. In a letter to Mayor Wilson of Bridgeport on Sept. 8 Mr. Storrs outlined the railway's position as follows:

> I have before me a copy of an ordinance passed by the Common Council last night regulating the jitneys within the city of Bridgeport, under which the operation of the buses is confined to certain specific streets. The most important of these routes are limited to areas within the city not supplied with any other means of public transportation and in two cases along streets where we have been unable to comply with the desires of the city for an extension of tracks due to our inability to obtain the necessary funds. Other routes have been defined operating from the city line on the west to the city line on the east, largely through streets not having railway tracks. * * *
>
> Now that the city of Bridgeport has expressed its preference for the electric railway operation with buses mainly regulated to a complementary service, we will be prepared to resume service on Sept. 20, and will give the people of Bridgeport the best service that can be produced with the facilities which the company controls. We feel confident that we will be able to satisfy the public in this regard and trust that in the future the relations between the city and the company may always be upon a co-operative basis.

Mayor Wilson, speaking in behalf of the Bridgeport public, expressed satisfaction with the Council's action. The Mayor issued a statement on Sept. 7, prior to the passage of the measure, in which he said:

> The conclusion reached by the Ordinance Committee of the Common Council, in their consideration of the problems of bus and trolley traffic, and which have been embodied in the ordinance reported to the Council this evening, will, in my opinion, receive the cordial endorsement of the public as they are based upon a full knowledge of the situation.
>
> Throughout the hearings and conferences with both the bus and trolley interests there has at all times been evident the utmost harmony, and it is gratifying to note that in the final outcome the interests involved have gracefully concurred with the Ordinance Committee in their efforts to provide transportation facilities which will meet the requirements of the community as a whole
>
> The bus routes have been planned with a view of providing adequate service of that nature without undue interference or competition with the operation of cars over the established routes while, at the same time, providing free choice and opportunity for the use of either or both by the riding public, and at the same time to provide transportation facilities to many sections of the city not now enjoying the same.

The jitney drivers, while dissatisfied with the regulations, are prepared to continue operation over the designated routes pending a thorough trial of the new plan. A formal statement issued on Sept. 8 in behalf of the jitneymen's association said in part:

> Jitney officials feel that the ordinance passed last night by the Board of Aldermen will prove wholly unsatisfactory to the public. With this particular factor in view we could not reasonably agree with the ordinance as indicated. The report of the Mayor's commission met with our approval, but for some reason or other which has not yet been explained to us, this same committee, after working for weeks to complete the work assigned to it, over night seems to evince a complete change of attitude. Those on the committee who might possibly have taken our view of the situation were wholly eliminiated from the joint discussions.

An ordinance similar to that approved in Bridgeport has been recommended to the Board of Aldermen of New Haven and probably will be passed at the meeting of the board next Monday night. New Haven had been notified that trolley service probably would be suspended there as in Bridgeport if ruinous jitney competition was not restricted.

Indiana Lines Urge Raise

Charles L. Henry and R. I. Todd Appear in Interests of Interurban Railways

Declaring that Indiana must take steps to prevent confiscation of coal by railroads in times of emergency, Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, appeared before the Public Service Commission on Aug. 31 in behalf of that company's petition for increases in freight and passenger rates.

Mr. Henry stated to the commission that during the recent serious coal shortage, when the company was daily facing curtailment of service through lack of fuel, the railroads held several carloads of coal, bought in the open market at a high price, and gave the traction company no information as to the whereabouts of the coal until the crisis had passed. This coal, he said, was valued at $15,899, bought at a price of from $8.75 to $10.75 a ton.

SLIGHT RISE IN REVENUE

Mr. Henry presented figures to the commission showing that for the first twenty-six days in August of the present year, revenue from passenger service increased 6.96 per cent over the corresponding period in 1919. Passenger business increased 1.3 per cent in a corresponding period, he said, making an average increase of 38½ passengers hauled a day. The business of the company in July of this year increased 17.5 per cent over July, 1919, his figures showed.

Mr. Henry said the company is now facing the necessity of paying about $4.85 a ton for contract coal, as against the price of $3.20 under its last contract. The company was unable to lay in a reserve supply of coal, and was forced to buy most of its coal on the open market.

A hearing on the petitions of the Union Traction Company of Indiana and the Gary & Southern Railway were to be held in the afternoon.

Requesting that if the Public Service Commission sees fit to deny an increase of rates for the Terre Haute, Indianapolis & Eastern Traction Company, the order be held in abeyance pending the granting of increased rates to steam roads, representatives of that company presented a petition to the commission to increase rates to 3.6 cents a mile for passenger service and a 40 per cent increase for freight rates. R. I. Todd, president of the company, testified that at present the company is merely meeting operating expenses, but a deficit appears when the interest on borrowed money is paid. Based on a 3.6-cent fare and a 40 per cent increase in freight rates to cover the increased cost of coal and other items, the net income for the ensuing twelve months would amount to $872,000, or approximately 6.77 per cent on the original investment, on a valuation basis of $32,000 a mile for the road.

Mail Pay Advanced

I. C. C. Hands Down Long-Expected Finding, Defining "Fair and Reasonable" Rates and Conditions

The Interstate Commerce Commission has announced its decision in the electric railway mail pay case. The commission has approved the space-basis system as fair and reasonable and has stipulated that the Post Office Department shall assume side, terminal and transfer service or pay for such service on ascertainment of its cost. The findings are to become effective on or before Dec. 6, 1920.

The commission set a rate for transportation of closed-pouch mail on a car constructed and run primarily for passenger service, with no separate compartment for mail, baggage and express, at 4 cents per mile of authorized car run, for ten pouches, sacks or parcels, or less. Where more than this number are regularly tendered at least 60 cu.ft. of space is to be authorized and the rate for the first 60 cu.ft. is to be 5 cents per mile run. For each additional 30 cu.ft. or fraction 1 cent per mile is to be allowed.

The rate for space in baggage or express cars or in baggage and express compartments of passenger cars is to be 3 cents per mile for the first 30 cu.ft. and 1 cent per mile for each additional 30 cu.ft. or fraction.

RATES FOR INDEPENDENT CARS

The rate for independent cars devoted to the transportation of the mails, on which railroad employees handle the mails, is to be 1½ cent per linear foot per mile for cars 20 ft. or less in length, inside measurement, and for larger cars 1½ cent per foot for the first 20 ft. and ¾ cent per foot for the additional length. When the postal employees handle the mail in railway post office cars the respective rates are 1¼ cent, and 1¼ and ⅝ cent.

The minimum annual rate on any electric railway mail route is to be $175.

When the railway companies are required by the Department to perform side, terminal or transfer service they are to be separately compensated on the basis of cost plus 3 per cent, whether the service is furnished by contracting or by the railways' employees. Cost in the latter case will include value of employees' time.

At least once in two years the Postmaster-General is to conduct tests to determine the number of pouches, sacks and outside packages that will fill 30 cu.ft. of space in a car or compartment thereof.

All of the existing postal regulation provisions with respect to the carriage of mails by electric railways are to continue in force, except as modified by the present ruling.

Nine-Cent Fare in Davenport

Court Permits This Rate to Take Effect After Proof That Seven-Cent Fare Was Inadequate—Settles Long Controversy

Inability of the Tri-City Railway, Davenport, Iowa, to secure relief from the socialist city administration led the traction lines to apply to the court and to the raising of fare in Davenport from 7 cents to 9 cents. With the 9-cent fare is a provision for three tickets for a quarter. This has been well accepted by the public. The 9-cent fare was put into effect on Aug. 28 by order of Judge A. J. House in the District Court when the traction lines introduced a sworn statement of earnings showing the 7-cent fare to be confiscatory.

THE 7-cent fare was also collected on a temporary injunction issued by the same judge. This order was secured on May 28 on the petition of a score of leading Davenport merchants. By it the city was enjoined from enforcing the old franchise rate of 5 cents. But this 7-cent fare proved inadequate and the company petitioned on Aug. 19 for a modification of the existing injunction. Basing its plea on the charge that the 7-cent fare was "unreasonable, unjust and confiscatory," and supporting this charge with a statement that the existing deficit on the company's books was $119,371, the company asked for a 10-cent fare.

BIG INCREASE IN WAGES

Increased labor cost was also cited by the company. When the 7-cent fare became effective the wage scale had a 60-cent maximum. Shortly afterward the trainmen's demands were settled by a board of arbitration with an advance of the maximum scale to 70 cents an hour.

With this advanced wage the net loss in June and July of 1920 was $11,412. This, if continued for a year, would amount to $68,816. It was estimated that even a 10-cent fare, with an approximate return of $159,098 annually, would fall $96,901 short of an 8 per cent return on the investment.

The company was able to cite the recent notable decision of the Iowa Supreme Court in the Ottumwa case in which it was held in substance that a franchise rate was not binding if it could be shown that the franchise rate was confiscatory.

CITY'S ARGUMENTS WEAK

Against this legal argument, backed with operating figures, the socialist city administration was able to offer but a weak opposition. The city had no contradicting facts to offer. An attempt was made to prove that the Iowa Supreme Court decision did not apply to the Tri-City Railway because it operated in other incorporated towns in Iowa and was therefore an interurban road. Another argument of the opposition was that the company's valuation figures were wrong because they did not coincide with assessed valuation figures on the tax books. The city's representatives also made other charges, mostly of a general nature, which they were unable to substantiate.

Judge House, after hearing both arguments, granted a temporary modification in his previous temporary injunction and raised the rate from 7 cents to the following schedule:

Adult cash fares, 9 cents.
Adult ticket fares, 8⅓ cents.
Children, 7-12 years, 5 cents.
Tri-city commutation tickets, 16 cents.

On the latter ticket a continuous ride is given from any Davenport, Ia., to any Rock Island or Moline, Ill., line. Bridge line tickets, taking a passenger from Davenport across the river to Rock Island, are 8 cents.

TICKET RATE POPULAR

The three tickets for a quarter provision has made the advanced rate popular. These tickets have been placed on sale at banks, department stores, cigar stands and many other stores and have enjoyed a heavy sale. With each three tickets a serial numbered receipt is attached. On cash fares a separate receipt is given. Both receipts entitle the holder to a refund if the present rate is not upheld by a permanent injunction.

Under the increased fare riding has fallen off but to what an extent the Tri-City Railway is not ready to make an official statement. Weather has been exceptionally fine, and traffic on short haul lines has been lighter than expected. While the percentage of decrease is greater than the company estimated, President B. J. Denman expects it to return near to normal as weather conditions become less favorable to walking.

WANTS MORE IN ILLINOIS

Within a week the company will take steps for an increase in Illinois, where the present fare, set by the Public Utility Commission, is 8 cents. Ten cents has already been asked and a hearing is expected in September. The commission has not yet set a date for this hearing.

Although the trainmen received a 10-cent increase through the board of arbitration last June, they have presented demands for a still further increase. Their present demand is time and a half pay for overtime. They now receive straight time, or 70 cents an hour maximum, for overtime. This demand has been referred to the old arbitration board and consideration of it or refusal to take up the matter is expected soon.

The action of Judge House in allowing the higher rate to take effect marks the end of a long struggle on the part of the company to secure financial relief. The city may appeal the case to the higher courts.

Jitney Law Valid

Court Upholds Regulatory Measure Passed by Waterbury Aldermen—Operators Denied Injunction

Judge George E. Hinman of the Superior Court has found that the action of the Aldermen of Waterbury in adopting the jitney regulatory ordinance was not so unreasonable as to render the measure invalid or to open its validity to such extent that its enforcement should now be enjoined. The court says that the suspension of the enforcement of the ordinance pending final hearing and the determination of the action are not warranted by the situation presented. The application for a temporary injunction was therefore denied. The ordinance sought to be enjoined designates as traffic routes for public service motor vehicles all except certain streets and portions of streets mentioned in the ordinance. Counsel for the jitney men claimed the ordinance to be void on the ground of unreasonableness.

JITNEYS UNDER CONTROL

Thomas F. Moore, secretary of the Chamber of Commerce of Waterbury, Conn., recently proposed that the city rely solely upon the trolley. That body, though its transportation committee, filed an elaborate survey of the local situation with the Board of Aldermen, who adopted the recommendations and passed an ordinance restricting the jitneys from operating on streets now served by the electric railway. In concluding his report Mr. Moore said:

> The solution of the present problem must be through regulation of the motor vehicle and establishment of a fair basis of competition. It is impossible to define without an actual traffic survey just what combination of trolley and jitney will be ideal. It must be learned by experiment and experience. The number of trolleys operating in Waterbury varies from thirty-three in the slow hours to eighty-two in the rush hours of the day. During the month of June, a daily average of 46,852 passengers carried shows the seriousness of the problem.
>
> A study has been made of the number of cars in service, their capacity, their schedule, routes, etc., and it is only after such investigation that the immensity of the passenger transportation situation can be grasped. According to public service operators, there are approximately 100 motor vehicles in public service use, including about thirty-eight large buses, and about forty smaller cars operating on the Naugatuck-Waterbury route. It is evident that large numbers of people are served by both vehicles and that to continue this service, careful action must be taken. The following procedure would seem to offer a possibility of ideal solution:
>
> 1. The trolley must for a period of experiment at least, be given the exclusive privilege of accepting and discharging passengers on the streets now occupied by their tracks.
> 2. The traffic division of the Police Department, or some especially appointed party, should make a survey, and check upon the service rendered.
> 3. Motor vehicles in the meantime should be permitted to operate on lines not served by the trolley and should, during this period, endeavor to supply that new service which will win them the sanction of public opinion.
> 4. If under such regulation it is evident that the trolley cannot or does not provide adequate service at reasonable rates, either to certain sections or at certain hours of the day, provision should be made to allow a supplementary use of motor vehicles under regulation in those sections or at these hours.
>
> The above suggestions offer a careful test and should prevent extreme measures which may work to the detriment of the public service. At the same time they permit of the proper development of motor bus service and provide for its reinstatement along all lines in so far as trolley service is inadequate. This solution recognizes the indispensability of the trolley, and also the merits of the motor vehicle through which it may hope to win the approval of public opinion. It may cause temporary inconvenience of some degree, but those so inconvenienced should see the problem in its entirety and judge accordingly.
>
> GENERAL REGULATION IMPERATIVE
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> Regulation of motor bus transportation—Regardless of the regulation as to routes of public service motor vehicles, there must be ultimately a general regulation either by state or municipal legislation which will safeguard the interest of the public. Such regulation should include:
>
> 1. Licensing of public service motor vehicles.
> 2. Establishment of a standard, assuring competence of operators.
> 3. Establishment of routes, schedules, and tariffs.
> 4. Limitation of passengers to trade capacity of cars.
> 5. Requirement of certain safety appliances and certified condition of vehicle.
> 6. Such miscellaneous conditions, as no collection of fares while in motion, no smoking in cars, the report of accidents to police, the display of tariff rates, inspection of vehicles, and the method of acceptance and discharge of passengers.
>
> Distinction must be made between the regular public service and the service performed by so-called taxis which are now governed by sufficient municipal regulations.
>
> CONCLUSION.—This report has been made by a committee whose sole purpose is to set forth that solution of a serious problem, which will work to the best interest of the public of Waterbury. The problem must be solved as soon as possible before it assumes proportions which will threaten the welfare of every resident of Waterbury and which will make solution all the more difficult and disastrous.

Louisville Request Provokes Comment

The Allied Public Service League of Louisville, Ky., has decided that the Louisville Railway had failed to show justification of 7-cent fares and has condemned the action of the Round Table in favoring that fare under a service-at-cost plan.

The chief objections to the Round Table's solution of the railway problem were the service-at-cost feature and the proposed change in the company's perpetual franchise. The local Trades Union Assembly has also declared against the fare increase, but this may be discounted in view of the failure of the strike of the trainmen last year.

The Advertising Club has come out in favor of 7 cents and two of the daily newspapers, long suspicious, have declared themselves convinced that the company needs the fare. All four of the daily papers are urging city officials to take immediate action one way or the other and questions the motives of the city authorities for their inaction.

May Raise Youngstown Fares

Indications point to an increase in the rate of fare at Youngstown, Ohio, from 9 to 10 cents, with 1 cent for each transfer. It is reported that the stabilizing fund of the Youngstown Municipal Railway has fallen below $50,000, which is the minimum limit. The report of operations for July had not reached Street Railway Commissioner W. L. Sause on Aug. 25. This report may change the status of the fund to some extent, but possibly not sufficiently to retain the present rate of 9 cents, with a penny for transfers.

No provision for a higher rate than the present one was made in the franchise of the Youngstown Municipal Railway, but the City Council is empowered to establish a higher rate, when next to the highest rate has been reached. When this rate, known as rate No. 1 became effective, the company filed a communication with Council, asking that a 10-cent rate be authorized in accordance with the franchise, but Council has so far failed to take action on the request.

During the past few weeks there has been a decrease in the revenue of the company, due to some extent to the high rates. Many persons have walked to save money, it is reported. Another factor is the curtailment of iron and steel mill operations, which has reduced the number of riders.

Merchandising Transportation Stressed by Commercial Body

The secretary of the Chamber of Commerce of Springfield, Mass., has written to the secretary of the Chamber of Commerce of Bridgeport, Conn., giving its views of local transportation. Some of the outstanding features of the statement of the Springfield body are:

That automotive transportation is yet in its infancy and for several years to come cannot be a reliable means of public transportation.

That industrial expansion is impossible without adequate transportation.

That transportation service must be a monopoly.

The letter says further:

> The sentiment in Springfield is that automotive transportation is yet in its infancy and for a number of years to come cannot be a reliable means of public transportation. On the other hand, there must be a satisfactory re-creation of public confidence in electric railway operation. We are convinced that the average city electric railway has omitted a very fundamental operation in its organization, namely, merchandizing its service, and I think that articles like those by Walter Jackson, street transportation engineer, are splendid for their suggestive value for the railways adequately to merchandize their service to their community.

Interurban Rise Attacked

Steps have been taken by the Kentucky Railroad Commission to proceed in the courts against the Louisville & Interurban Railroad, Louisville, as the result of an increase in the rate of fare charged by the company from a basis of 2½ cents a mile to one of 3 cents a mile. The new rate became effective on Sept. 1, the company acting in the matter without first consulting the commission. The 2½-cent rate was set by the commission on Aug. 1, 1919, to stand until the commission saw fit to authorize a change. The commission has ordered Attorney General Dawson to institute injunction proceedings to restrain the railway from collecting the new rate. This is the first occasion on which the commission has attempted to indict an electric railway and is the first step taken to determine what power is lodged in the utilities board.

Transportation News Notes

Eight Cents in Dixon.—Cash fares on the city lines of the Sterling, Dixon & Eastern Electric Railway, Dixon, Ill., were raised on Aug. 13 to 8 cents. The fare between Dixon and Sterling was raised to 25 cents. The increase was authorized by the State Public Utilities Commission.

Appeals to Court in Fare Case.—The Jersey Central Traction Company, Keyport, N. J., has appealed to the State Supreme Court from a recent ruling of the State Board of Public Utility Commissioners refusing it permission to increase its fares. The company had applied for an advance from 7 cents to 10 cents in each zone.

Tokens in Toledo.—The metal tokens adopted for use in the fare boxes of the Toledo Railway & Light Company, Toledo, Ohio, were put in service on Sept. 1. The coins are smaller than a penny and are made of white metal. They have the Doherty emblem on one side and the legend "One Fare—T. R. & L. Co.,—F. R. Coates, Pres't." on the other. A triangular hole is cut in the center. The tokens are sold at the rate of three for 20 cents.

Trailers Soon on Baltimore Lines.—One hundred new trailer cars will shortly be operating on the lines of the United Railways & Electric Company, Baltimore, Md. The cars have already been ordered and the first four arrived in Baltimore on Sept. 1. Two-car trains have been in use in Baltimore for a number of years and the present cars will be used in the same manner as the company is now operating two-car trains to Sparrows Point.

May Raise Pine Bluff Rate.—An ordinance has been introduced in the City Council of Pine Bluff, Ark., which, if passed, will permit the Pine Bluff Company, operating the electric railway system in that city, to raise its fare from 6 cents to 7 cents. The proposed measure authorizes the company to sell four tickets for 25 cents. It also provides for an increase in power rates of 1 cent a kilowatt. The company recently raised the pay of the carmen in its employ.

Chicago & West Towns Gets Increase.—Effective on Aug. 4 the Chicago & West Towns Railway, Chicago, Ill., was granted an increase which abolished all ticket rates and established a minimum fare of 10 cents. The fare from Chicago to LaGrange, Ill., remains at 15 cents, though the fare within LaGrange, as in other towns served, is 10 cents. This abolishes the former rate of 7 cents cash with four tickets for 25 cents within towns and a 10-cent cash fare or 8-cent ticket between towns.

Jersey Line in Need.—The Burlington County Transit Company, Hainesport, N. J., has applied to the State Board of Public Utility Commissioners for permission to increase its fare to 7 cents where 5 cents is now charged. The company is now charging at the rate of about 2 cents a mile, and the proposed increase will make the rate about 3 cents. The road has never been a financial success. The company is one of the last in the State to apply for an increase in fares and the last to operate on a 5-cent schedule.

Seven Cents in Bellingham.—The Washington Public Service Commission on Aug. 26 permitted the filing of a 7-cent fare schedule by the Puget Sound Traction, Light & Power Company for its lines in Bellingham. The commission fixed Sept. 1 as the date for the new fare to become effective. The City Council of Bellingham approved the 7-cent fare, on condition that the carmen be given wage increases. The individual fare increase is from 6 to 7 cents, with the number of commutation tickets purchasable for $1 reduced from seventeen to fifteen.

Six Cents in St. Paul.—A 6-cent fare will go into effect in St. Paul, Minn., on Sept 13, making the rate the same as in Minneapolis. At present there is a neutral zone into which Minneapolis patrons ride for one fare, about two miles within St. Paul territory. Business organizations have asked for retention of this zone. The St. Paul City Council will amend its ordinance so that control of this zone fare is retained by the Council. The increase in fare was granted to the Twin City Rapid Transit Company to enable it to meet the demands of its carmen for an increase in wages. The St. Paul carmen had threatened to strike unless their pay were raised.

Hull Pensioners Carried Free.—Old age pensioners of the city of Hull, England, of whom there are 5,000, may hereafter ride in the trains of the tramways company without payment of fare. Heretofore this privilege has extended to the blind and to men who lost a leg in the war. The decision of the tramways committee was not put into effect without opposition, however. The tramways manager estimated that it would cost the company £10,000 a year. Also it was insisted that the Government should increase the old age pensions. All these objections were finally voted down, and hereafter old age pensioners may ride free on Hull tramcars.

Will Raise Interurban Rates.—Notice has been filed with the State Public Service Commission by the Puget Sound Traction, Light & Power Company, Seattle, Wash., that passenger fares on the company's interurban lines will be increased an average of 11 per cent effective Oct. 1. Tariffs embodying freight rate increases on the same lines, ranging from 20 to 25 per cent, to correspond with increases granted to steam roads, are being prepared for filing, and will take effect not later than Oct. 1. The new passenger fares are based on a mileage basis, with minimum charges fixed in the new rates, both on a single trip to any point, on school tickets, commutation tickets and general tickets for children taking half fare.

New Vote on Duluth Fares.—Voters of Duluth, Minn., will decide on Oct. 4 whether the Duluth Street Railway shall be allowed to charge a 6-cent fare on its local lines. An ordinance granting the company an increase from 5 cents to 6 cents was turned down at a referendum election on June 21. Following the rejection of the measure the car men asked for a pay increase. This demand the company refused on the ground that the payment of higher wages was impossible under the nickel fare. On July 20 the men walked out, but returned to work after a one-day strike with the understanding that their wages should be increased and that a new fare ordinance should be submitted to the voters.

P. R. T. Petition Withdrawn.—Permission has been granted to the Philadelphia (Pa.) Rapid Transit Company by the State Public Service Commission to withdraw the rate schedule under which the company proposed to increase its fare through the elimination of free transfers and the charging of 3 cents for exchange tickets. The schedule was filed by the company on June 1 last, but was never put into effect because of opposition from the city authorities. Thomas E. Mitten, president of the P. R. T., recently applied to the commission for authority to withdraw the schedule. Such a course was opposed by the municipal authorities on the ground that it would jeopardize the appraisal of the company's property, now under way. In allowing the company to withdraw the 3-cent rate, the commission directed that the appraisal be continued.

Tokens Cost More at Pittsburgh.—Pittsburgh car riders began paying an increased rate for tokens on Sept. 1, the Pittsburgh Railways advanced the token rate from 7½ cents to 8⅓ cents. The cash fare remains at 10 cents. Three tokens are now sold for 25 cents. To avoid unnecessary expense the company decided not to change the style of tokens in use, relying upon the honesty of its patrons not to stock up on the metal disks in anticipation for the rate advance. Hardly had this announcement been made when a mad rush to buy tokens began. The buying continued uninterrupted for several days. Then the company had to do something or run out of the metal disks. It therefore restricted the sale to two tokens to each rider instead of the customary four for 30 cents. Some of the conductors estimated that 80 per cent of their passengers were buying checks at every opportunity. A few passengers who did a great deal of riding in the days immediately preceding the increase are said to have purchased from fifty to 100 checks each.

Personal Mention

Charles A. Kolstad, secretary-treasurer of the Elmira Water, Light & Railroad Company, Elmira, N. Y., has resigned to enter the garage business in Seattle, Wash. Mr. Kolstad joined the Elmira system in 1910. Prior to that time he was traveling auditor for the United Gas & Electric Company.

C. I. Kephart, formerly electrical and valuation engineer of the Oregon Public Service Commission, has removed to Washington, D. C., where he has taken up his new duties as an examiner with the Interstate Commerce Commission. Mr. Kephart has been connected with the Oregon Commission for several years.

Arthur F. Brooks has been appointed superintendent of lines of the Brockton division of the Eastern Massachusetts Street Railway, Boston, Mass. Mr. Brooks will have charge of both office and construction work for the division. He has been connected with the company and its predecessor, the Bay State Street Railway, for the past fourteen years.

D. J. STROUSE

Walter E. Miller has resigned from the staff of the Wisconsin Railroad Commission to engage in private practice as a consulting engineer. Mr. Miller has opened offices in Madison, Wis. He has been connected with the commission for the past fourteen years. His practice will include investigations and studies of steam railroads and electric railways.

R. A. Wilson, general superintendent of the Washington Water Power Company, Spokane, Wash., left Spokane recently for a tour of the Pacific Coast and Middle West States. Mr. Wilson will be gone from his desk for about six weeks. He will inspect the large amusement parks in various cities to obtain new ideas for use at Natatorium Park, operated by his company.

D. J. Strouse, Comptroller

Auditor of the Twin City Rapid Transit Company Has Been Promoted—Mr. Macdonald Also Advanced

To facilitate the handling of the financial affairs of the Twin City Rapid Transit Company, Minneapolis, Minn., the office of comptroller has been re-established. Daniel J. Strouse, for several years auditor of the company, has been appointed to the new position. S. Macdonald has been given the title of assistant comptroller. The office of auditor has been abolished. Mr. Strouse and Mr. Macdonald will co-operate with E. A. Crosby, treasurer of the company, in directing the financial aspects of the operation of the traction system of Minneapolis and St. Paul.

Mr. Strouse was born on Nov. 6, 1879, at Charles City, Iowa. He attended the public schools there and for a short time was a student at Nora Springs, Iowa He was then employed by an abstract firm for three years and later represented Fleener & Carnahan, an Indianapolis firm of tax experts, for three years, checking up tax matters for the State and for various counties. In 1903 Mr. Strouse removed to Minneapolis, where he became general bookkeeper for the local traction system. Four years later Mr. Strouse was promoted to auditor.

Mr. Macdonald is thirty-six years old. He is a native of Duluth, Minn., where he made his home until five years ago. He received a common school education and in 1900 entered the service of the Duluth Street Railway as an office boy. After working in various capacities he was transferred to the accounting department, and, in 1912, he was made auditor of the company. Three years later he resigned to become assistant to the auditor of the Twin City Rapid Transit Company, continuing in that capacity until his recent promotion to be assistant comptroller.

Roy Connell, a signal inspector of the Brooklyn, (N.Y.) Rapid Transit System, has been appointed sales engineer of the General Railway Signal Company with headquarters in New York City. Mr. Connell entered railway work in 1895 as a signal helper with the Chicago & Northwestern Railway. After serving with that road and several manufacturing companies, he became designing engineer of electric interlocking apparatus for the Hall Switch & Signal Company. A year ago he resigned to join the B. R. T.

Franklin T. Griffith, president of the Portland Railway, Light & Power Company, Portland, Ore., has been reappointed chairman of the Water Power Development Committee of the National Electric Light Association. Mr. Griffith's reappointment to this position comes as a recognition of the splendid work which he has performed during the past year in behalf of the committee. In connection with his duties as chairman of the committee, Mr. Griffith has been spending some time in Washington, D. C., attending a conference of the Federal Power Commission.

George V. Hansler has been appointed assistant superintendent of signals of the Brooklyn (N. Y.) Rapid Transit Company. Mr. Hansler was born in Washington, N. J., on March 9, 1890. In 1901 he went to work in the signal department of the New York Central Railroad. He was later employed in the capacities of signalman, wireman and foreman, at various times, by the Hudson & Manhattan Railroad, the New York, New Haven & Hartford Railroad, the Long Island Railroad, the Erie Railroad and the General Railway Signal Company. He entered the service of the B. R. T. in June, 1914, and was assigned to the signal division as a signal maintainer. In May, 1919, he was appointed assistant supervisor of maintainers. He was later promoted to supervisor of maintainers.

S. MACDONALD

George S. Williams, whose appointment as general manager of the Androscoggin Electric Company, Lewiston, Maine, was announced in a recent issue, has been connected with the Central Maine Power Company for a number of years. While devoting most of his attention to his new duties at Lewiston, Mr. Williams will continue his connection with the Central Maine organization as general superintendent. Mr. Williams was born in Augusta, Maine, Sept. 9, 1882. In 1903, after studying for three years at the University of Maine, he became connected with the old Kennebec Light & Heat Company, which later became a part of the Central Maine Power Company. From June, 1903, to May, 1904, Mr. Williams worked in Augusta. He was then sent to Gardiner, where he worked for two years as lineman and inside wireman. Three years ago he became general superintendent of the company.

A. V. Kipp, general passenger and freight agent at Butte, Mont., for the Oregon Short Line, has been appointed to a similar position with the Salt Lake & Utah Railroad, Salt Lake City, Utah. Mr. Kipp began his railroading experience twenty years ago as traveling freight agent of the Union Pacific.

R. N. Ward has been appointed claim agent of the Southern Public Utilities Company, Charlotte, N. C. Mr. Ward succeeds the late Luther Guy. For the past fifteen years Mr. Ward has been connected with the Southern Railway as claim agent, chief clerk to the division superintendent, and in other positions. His headquarters will be at Greenville, S. C.

Dr. S. W. Stratton, director of the National Bureau of Standards, has sailed for Europe to attend a meeting of the International Bureau of Weights and Measures in September. Dr. Stratton will be the principal American representative to discuss proposed changes in function and scope of the bureau to include custody of other standards than weights and measures.

Wigginton E. Creed has been elected to succeed Frank E. Drum as president of the Pacific Gas & Electric Company, Sacramento, Cal. The company owns about 40 miles of electric railway line in addition to operating large central station installations. Mr. Creed is president of the Hooper Lumber Company and is interested in the East Bay Water Company, Oakland, Cal. Mr. Creed was the guest of honor at a recent banquet at the Palace Hotel, San Francisco, given by John A. Britton, vice-president and general manager of the Pacific Gas & Electric Company, to the board of directors, heads of departments and district managers of the company. Mr. Drum was president of the company for several years. He resigned to give his attention to other enterprises.

Lyndon Clapp has returned to the service of the Boston (Mass.) Elevated Railway after an absence of two years, during which he has held the position of assistant superintendent of the Water Department of Waltham, Mass. Mr. Clapp will resume his work in the engineering department of the Elevated. He was born in Boston in 1874. Removing to Waltham at an early age, he was educated in the public schools of that city, graduating from the Waltham High School in 1894. After serving for a number of years as rodman and timekeeper on various construction projects he went to the city of Newton as transitman. Later he was employed by the firm of Pierce & Barnes on the laying out and rebuilding of several lines of the Bay State Street Railway, now the Eastern Massachusetts Street Railway. In 1906 he entered the employ of the Boston Elevated Railway, his work consisting of the making of surveys and track building. Two years ago he resigned to become assistant superintendent of the Waltham Water Department.

R. B. Palmer Advances

Chief Engineer Succeeds H. E. Allen as General Superintendent of the Saginaw-Bay City Railway

Horace E Allen, general superintendent of the Saginaw-Bay City Railway, Saginaw, Mich., has resigned. Mr. Allen is succeeded by Russell B. Palmer, who has been serving as chief enginer of the company. In addition to directing the traction properties of Bay City and Saginaw and the interurban lines operating between these two cities, Mr. Palmer will have the duties of general superintendent of the Northeastern Division of the Michigan Railroad, the Consumers' Power Company and the Michigan Light Company.

Mr. Palmer joined the Saginaw-Bay City Railway in 1905. He was born in Saginaw in 1887. Two years after entering the company's employ he went to Ann Arbor, where he studied at the University of Michigan, from which he was graduated as a civil engineer in 1911. Following his graduation he rejoined the company, serving in the engineering department. He has been chief engineer of the railway for a number of years.

R. B. PALMER

Mr. Allen became general superintendent of the property about a year ago. He was formerly assistant general manager of the Springfield (Ill.) Consolidated Railway. He is a graduate of the Massachusetts Institute of Technology. After completing his electrical engineering course there, he accepted a position with the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. In 1910 he became connected with the Toledo Railways & Light Company, Toledo, Ohio, under J. F. Collins, then assistant general manager. When Mr. Collins, now vice-president and general manager of the Michigan United Railways and the Michigan Railroad, resigned his position at Toledo, Mr. Allen was placed in charge of the Toledo, Ottawa Beach & Northern Railway and the Maumee Valley Railway & Light Company. He assumed the position of assistant general superintendent of the Michigan Railway in Sept. 1916. In the following year he resigned to become assistant general manager of the Springfield Consolidated Railway. A year ago he returned to the Michigan properties as general superintendent.

Obituary

Dr. Samuel Sheldon, professor of electrical engineering at the Brooklyn (N. Y.) Polytechnic Institute, died in Middlebury, Vt., on Sept. 5. Professor Sheldon was the author of a number of engineering works and was the joint author of "Electric Traction and Transmission Engineering." He was fifty-eight years old.

Arthur Diekmann, secretary-treasurer of the St. Louis Car Company, died recently after a serious operation. Mr. Diekmann was thirty-eight years old. He had been employed continuously by the company since his graduation from high school at the age of eighteen years. He began as a time-keeper and won his way to a responsible position, at the same time making a host of friends.

Dennis Dwyer, president of the Dayton, Covington & Piqua Traction Company, West Milton, Ohio, died at his home in Dayton, Ohio, on Aug. 27. Mr. Dwyer was ninety years of age. He had been a leading lawyer, business man and traction promoter in Dayton for many years. He was born in Ireland and came to this country when a boy. He secured an education by studying at odd moments and finally completed a law course. For several years he served as a Judge on the Common Pleas bench.

Prof. John Perry, F. R. S., who was closely identified with tramway developments in England and France, died at his home in London on Aug. 4. Professor Perry was well known in the United States, as well as in Great Britain for his work in electrical research. He was born in Garvagh, Ireland, in 1850. Graduating from Queen's College, Belfast, he became an instructor of physics at Clifton. In 1874 he became honorary assistant to Sir William Thomson (Lord Kelvin) at Glasgow. In the following year he went to Japan as Joint Professor of Engineering in the Imperial College of Engineering, where he remained until 1879. In association with the late Professor Ayrton he did much electrical work while in Japan, and on their return in 1879, Professor Perry organized the works of Messrs. Latimer Clark & Muirhead. Jointly with Professor Ayrton, he carried on much electric lighting and traction work. Among his numerous inventions was the multipolar dynamo in 1882. In 1885 he was elected a Fellow of the Royal Society. He retired from the Royal College of Science about six years ago.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Loom Prices Firm Despite Lower Cotton

Demand Less and Stocks Are Better, but Raw Material Was Bought at Spring Prices

Continued firm prices, slight building up of stocks and some decrease in demand mark the non-metallic flexible conduit situation. No immediate price reductions are to be expected, according to manufacturers, notwithstanding the recent declines in the cotton market. These makers claim that they were obliged to buy cotton in advance in order to cover themselves on the large volume of orders which they accepted last spring. As a consequence loom is priced according to the spring price of cotton. In the New York markets current quotations are about $32.50 and $35 for $\frac{7}{32}$-in. and $\frac{1}{4}$-in. loom respectively.

Stocks are beginning to build up and some jobbers and manufacturers can ship immediately. Other manufacturers say that they have orders on hand for the next three months' production. Deliveries have been hampered by railroad trouble, but this trouble is diminishing. Labor conditions are satisfactory and production is reported to be normal.

As a general condition demand is falling off to some extent, though it is still fairly strong. Collections are on the whole very good.

Sales of Westinghouse and G. E. Growing Fast

Improvement in Transportation Is Reflected in Recent Increase in Billing of Companies

In the first six months of 1920 General Electric Company booked total sales of $190,000,000, or at an annual rate of $380,000,000. The best figure recorded previously was about $230,000,000 of gross sales in 1919. No longer ago than in 1916 the company was transacting business at an annual rate of only $134,000,000. During the first half of this year orders were shipped at a rate of $260,000,000 per year, but an improvement in transportation facilities is evident from the recent increase in billings which were going forward at an annual rate of approximately $275,000,000 the latter half of July. Bookings, however, have slightly dropped off, for in the same period orders were received at a rate which would only amount to $375,000,000 for the year's total. The summer trade slackness is held accountable for this decrease.

The Westinghouse Electric & Manufacturing Company, it is reported, booked orders for April, May and June, the first quarter of its fiscal year, amounting to approximately $41,000,000, as compared with about $34,000,000 in 1919. This is at an annual rate of more than $160,000,000. During the same period the amount of goods shipped totaled approximately $31,000,000, or almost $7,000,000 ahead of the figures for 1919. However, outstanding orders on the company's books on April 1, 1920, the beginning of the fiscal year, were but $71,000,000, it is learned, while on July 1 the total was approximately $85,000,000, indicating the increasing transportation difficulties. During the month of July the shipping situation eased up sufficiently to allow orders to be shipped at close to an annual rate of $160,000,000. Bookings also increased during that time and at present a yearly rate of about $180,000,000 is said to be a close approximation.

Buying of Steam Roads Will Affect Market

Expenditure of About $750,000,000 in Equipment Should Lengthen Deliveries and Reduce Supplies Available for Traction Companies

In view of the close connection between the electric and steam railways so far as purchasing much of their equipment in the same market is concerned, the proposed program of expenditures of the latter is very important. The buying of track and roadbed material, car wheels and trucks, signal equipment and many other items by steam roads has a very direct bearing upon the supplies of the same goods available for traction companies. If the large carriers throughout the country should within the next few months place the greater part of orders they are now contemplating the market may be expected to be oversold for a long time to come, with chances of favorable deliveries pushed further into the background.

According to the estimates received by the Interstate Commerce Commission, the needs of the main carriers in the United States, constituting more than 100 lines, will necessitate expenditures aggregating more than $750,000,000. The greater part of this buying is said to be contemplated for 1921. Orders as yet have not been placed in large volume, mainly because of financial difficulties. Following the relief accorded to railroads by the inauguration of increased passenger and freight rates, however, steps have been taken to raise much of the $750,000,000 through private loans on the strength of improved credit. The I. C. C. has also approved applications for nearly $200,000,000 in railroad loans under the provisions of the Esch-Cummins Act. The carriers are now operating on their own initiative since the first of September, and though this may induce a short period of readjustment, it seems logical to believe that in combination with the above mentioned factors, it will result in hastening the anticipated buying. An indication of this is evident in the increased demand that is even now felt in certain lines, such as spikes, bolts, rails, etc.

More than a fourth of the estimated expenditures that will be made for improvements and extensions will be applied on track and roadbed equipment it is reported. Not quite a fourth of the total sum will go for rolling stock additions and repairs, and included in this quota is a provision for 30,000 box cars alone, not to mention open top cars, passenger coaches, refrigerator cars and locomotives. All this equipment will vitally affect the market for purchases along similar lines by electric railways. The balance of the budget will be divided among stations, shops, signal plants and among other departments.

Menace to Trade in Cancellation of Orders

National Chamber of Commerce Reveals Wide Extent of Practice—Danger in Regarding It Leniently

From time to time reports are received from electrical manufacturers of cancellations in their field. This is a tendency which, if regarded as unimportant, may assume serious proportions, according to the Chamber of Commerce of the United States. The latter has completed a survey of the manufacturing field which reveals the great prevalence of the cancellation evil in almost every phase of business. No separate classification of the electrical industry is apparently made in this report, but the general conclusions are interesting.

Inquiries were sent to 106 leading trade associations to learn the situation.

Some of the chief reasons given for cancellations were: Inability to make prompt delivery, overstock, business declining, revision of production schedule and financial embarrassment. The lumber industry seems to have been one of those hardest hit, as over 3,500 cars have been canceled in one division alone since January.

Responsibility does not rest wholly with the buyer, however, it is stated. Some factories have been in the habit of accepting considerably more orders than they knew they could fill, with the expectation that a certain proportion would be canceled. It is this tendency to regard the practice leniently which is said to represent a menace to the integrity of the country's business structure, as even the most upright of customers have indulged in the practice.

Several trade organizations have taken steps toward remedying the situation by creating advisory bureaus to pass upon the claims for cancellation grounds. The Chamber of Commerce will also take further steps in attempting to preserve the validity of all contracts.

Production of Friction Tape Increasing

Output Is Reducing Back Orders—Demand for Cotton Tape Is Especially Heavy

Friction tape is being produced at a rate which is rapidly overcoming back orders, according to leading manufacturers. Cotton insulating tape, on the other hand, is in great demand, and production is falling behind orders. A leading maker of friction tape recently informed the ELECTRIC RAILWAY JOURNAL that all production records were broken in his plant in a recent week, a total of 200,950 lb. being turned out. Tape manufacturers state that the raw material supply is now very satisfactory. Transportation conditions are improving, and a slackening of demand compared with a few weeks ago is facilitating the filling of back orders. Stocks are spotty, some makers having little tape on hand and others being prepared to make almost immediate shipment. Recent moderate reductions in the price of cotton have been insufficient to affect the price of friction tape to any extent. The latter quotes in representative cases from 60 to 70 cents per pound, according to quantity and quality involved. A representative jobbers' price last week on ¾-in. black friction tape was 68 cents per pound on lots of less than 10 lb., 60 cents on 10 to 25-lb. lots and 57 cents on 25 to 100-lb. lots.

One prominent distributer has sold four times as much tape to date this year as for the same period last year, and still can make immediate deliveries on fairly good-sized orders. Another producer reports 80 per cent more business this year, the month of July showing the largest production in the company's history. Foreign business is running about 15 per cent ahead of last year, this manufacturer states. Deliveries can easily be made in two to three weeks in large quantities. Labor conditions are steady for the time being, and since the wage increase accorded about three months ago production has been coming along well. Black and gray tapes are being sponsored vigorously by some manufacturers at present for use instead of white friction tape.

High-quality woven tapes used in the insulation of electrical machinery coils are in great demand. Deliveries are being quoted on about three months' basis. Prices are firm, with extremely wide range according to weave, size and quality purchased. A representative tape of high-class finish used in field coil winding sells for about $3 50 per gross yard, and a good quality used in armature coil work runs around $2. The cost of labor is a primary factor in price advances that have been made in the past, as well as in the increases in the price of the high-grade cotton involved in manufacture. No less than four handlings are required in preparing the raw yarn for weaving in one of the leading makes, and after the weaving the finishing process or calendering to exact size calls for skilled work. The thinner tapes must be finished with extreme accuracy on account of the space limitations of slots. It is not feasible to predict future price movements, but so long as raw material and labor costs remain close to present levels it is hard to see any early downward movement. Factory stocks are practically cleaned out and orders are holding up well.

Smaller Bulbs in 23-Watt Street Railway Lamps

The Edison Lamp Works of the General Electric Company announces that the 23-watt, S-19 bulb street railway lamp, listed on page 11 of its Data Book, will be superseded by an S-17 bulb. Arrangements have already been made to carry out this plan and from now on all of these lamps will be made with the S-17 bulb, which is similar in all respects to the S-19 type except that it is smaller in size. The new bulb is 2⅛ in. in diameter compared with 2⅜ in. for the old model. The new bulb is also smaller in length, giving a height of 4⅞ in. over all instead of 5¼ in. as in the S-19 type.

The reason for making the change is because of the saving in glass effected and the smaller space required for packing and shipping the lamps. The lighting qualities of the two bulbs are the same.

The new S-17 bulb is designed to operate in series with the old type so that customers who may not wish to make the change all at once will be able to use both bulbs. Because of the advantage of giving a uniform appearance, however, it is advised that a whole car should be changed over at one time.

Rolling Stock

Chicago Surface Lines, Chicago, Ill., has requested bids on fifteen standard safety cars.

Spokane & Eastern Railway & Power Company, Spokane, Wash., is spending $300,000 this year in improvements to rolling stock, mostly in electric equipment, and for bridges. The city cars are being remade into one-man cars, one-half of which have already been so altered.

Twin City Rapid Transit Company, Minneapolis, Minn., is changing over 300 cars to the front exit type. Castings have been delaying the work, but are now being received at the shops. New heating apparatus will be installed to cope with the severe climate. About 175 of the remodeled cars will be placed in service on the Minneapolis lines and the balance in St. Paul.

Pekin Municipal Railway, Pekin, Ill., will receive three new cars within the next thirty days. The cars are now being built by the American Car Company, St. Louis, Mo.

Northampton Street Railway Company, Northampton, Mass., has purchased two McGuire-Cummings sweepers, to be delivered on Oct. 1.

Omaha, Lincoln & Beatrice Railway Company, Lincoln, Neb., announces that it is in the market for a snow sweeper.

The Richland Public Service Company, Mansfield, Ohio, states that it has purchased two four-motor equipments to replace old motors on two interurban cars. The new motors are General Electric, No. 247.

Track and Roadway

Eastern Massachusetts Street Railway, Boston, Mass.—The Eastern Massachusetts Street Railway was granted permission to extend the tracks of a turnout on Water Street, between Main and Church Streets.

International Railway, Buffalo, N. Y.—Street and track repairs which will cost $500,000 will be undertaken at once in Buffalo by the International Railway. Herbert G. Tulley, president of the company, has submitted to the City Council a list of streets in which the company will make improvements.

International Railway, Buffalo, N. Y.—City Manager E. J. Fort of Niagara Falls has been authorized by the City Council to advertise for bids for repaving between the tracks of the International Railway, Buffalo, on certain Niagara Falls streets. The company has agreed to repay the city in ten annual installments.

New York (N. Y.) Railways.—Federal Judge Mayer has authorized Job. E. Hedges, receiver of the New York Railways, to sell the property covering the block between Park and Lexington Avenues and Thirty-second and Thirty-third

Streets, which was used by the Madison & Fourth Avenue Railroad as a carhouse. It is believed that orders authorizing the receiver of the New York Railways to sell other carhouse property in the vicinity of Fiftieth Street will be signed soon.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Trenton & Mercer County Traction Corporation is making a number of improvements to the line in the centre of Trenton. New switches and rails are being laid on East State Street and in other sections.

Public Service Railway, Trenton, N. J.—The Borough Commission of Collingswood, N. J., has ordered the Public Service Railway to lay a new roadbed and tracks from Lincoln Avenue to the city line. The company last spring gave notice that the work could not be done this year because of limited finances, but the borough officials insist that the improvement be done at once so concrete paving can be laid.

Omaha, Lincoln & Beatrice Railway, Lincoln, Neb.—The Omaha, Lincoln & Beatrice Railway in the early fall expects to complete 2½ miles of track.

Richland Public Service Company, Mansfield, Ohio.—The Richland Public Service Company expects to build ¾ mile of new track of 100 lb. "A. R. A." rail laid in concrete with International Steel ties and paved with brick.

Oklahoma Railway, Oklahoma City, Okla.—The Oklahoma Railway, which owns and operates an interurban line between Oklahoma City and Guthrie, will soon begin work on an extension of the line from Guthrie to Stillwater, the seat of the Oklahoma Agricultural and Mechanical College, according to announcement by John W. Shartell, president.

Portland Railway, Light & Power Company, Portland, Ore.—The Portland Railway, Light & Power Company has notified the Public Dock Commission that it will operate the extension of the St. Johns Street railway line to municipal terminal No. 4 at actual cost. It was originally agreed that the traction company would operate the extension at cost plus 10 per cent, thus giving the company a profit, but the commission recently issued an order that the extension be operated on a cost basis.

Power Houses, Shops and Buildings

Omaha, Lincoln & Beatrice Railway, Lincoln, Neb.—The Omaha, Lincoln & Beatrice Railway is constructing a storage house and repair shop 50 ft. x 150 ft. The construction is absolutely fireproof, being reinforced concrete with tile roof and steel sash.

Richland Public Service Company, Mansfield, Ohio.—The Richland Public Service Company is just completing the installation of a new 10,000 kw. G. E. turbine and the construction of an additional 11-mile 66,000-volt transmission line. The construction of a 15,000-kw. outdoor substation is being started.

Northern Ohio Traction & Light Company, Akron, Ohio.—E. B. Atchley, publicity manager of the Northern Ohio Traction & Light Company, announces that real progress is being made on the new $300,000 East Akron carhouse. The work is being done by the H. P. Moran Construction Company. The building is of brick with stone trimmings. Plans have been made for the storage of 100 cars in the carhouse and the work of installing machinery of the latest type will begin shortly.

Mobile Light & Railroad Company, Mobile, Ala.—The Mobile Light & Railroad Company has drawn plans for a new carhouse 100 ft. x 192 ft. The building will be of Truscon steel with concrete foundation and pits. At present the company is installing one new 768-hp. Class "M" 28 Stirling boiler to be equipped to burn fuel oil. Recently the company contracted for one new 1,000-kw. Westinghouse steam turbine, connected through reduction gears to Westinghouse 600-volt d.c. generator. Delivery on this unit will be expected in about eight months.

Trade Notes

The Black & Decker Manufacturing Company, Towson Heights, Baltimore, Md., has increased its capital stock from $350,000 to $2,000,000.

The J. G. Brill Company, Philadelphia, Pa., announces that its London office has been removed from 110 Cannon Street to 150 Southampton Row, London, W. C. 1.

The Arrow Electric Company, Hartford, Conn., manufacturer of switches and other electrical equipment, has awarded contract for construction of an addition to its plant, 33 ft. x 40 ft.

The Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has awarded contract for the erection of a one-story addition to its plant at Essington, 120 ft. x 200 ft., to be used as a foundry.

The General Electric Company, Schenectady, N. Y., has filed plans for the construction of a one-story building at its plant at Columbia Avenue and Putnam Street, Baltimore, Md., recently acquired from the government. The factory will be used for the manufacture of electric switches and other specialties. It also announces that the Fort Wayne Electric Works of the company at Fort Wayne, Ind., has filed plans for the erection of a building there, at Wall Street and Broadway, to cost about $325,000.

The John C. Dolph Company, 168 Emmett Street, Newark, N. J., manufacturer of insulating varnishes and compounds, announces the appointment of Baker-Joslyn, 183 First Street, San Francisco, Cal., with branches in Los Angeles, and Seattle, Wash., as general sales agents and distributers of its products on the Pacific Coast. L. D. Fleig, 212 West Austin Street, Chicago, Ill., has been appointed general Middle Western sales agent. The Edgar O. Oeters Company, the Bourse, Philadelphia, will represent the company in Philadelphia and contiguous territory.

The Roller-Smith Company, 233 Broadway, New York City, announces that C. H. Mohr has been added to the sales force of its Baltimore representative, the Perkins-LeNoir Company, 113 East Franklin Street. He will devote his attention to the various lines of electrical apparatus handled by the Perkins-LeNoir Company and will specialize in the Roller-Smith products, comprising electrical instruments, meters and circuit breakers. Mr. Mohr has been connected in the past with the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., and with the Standard Electric Elevator Company, Baltimore.

The Johnson Fare Box Company, manufacturer of the registering fare boxes used on the cars of a great many city properties, has moved into its new building in Ravenswood, Chicago, Ill., which it is expected will greatly facilitate the production of fare boxes and enable the company to make more prompt deliveries. The business of the company has grown so extensively in the last few years that its old quarters were outgrown and it was decided that the best way of enlarging its manufacturing facilities was to build a plant of its own. The new building has a frontage of 125 ft. and a depth of 167 ft. It is a three-story building constructed of concrete and brick with continuous windows on all four sides which provide unusually good lighting and ventilation facilities. The floor space totals over 62,000 sq.ft. and about 400 men are employed.

New Advertising Literature

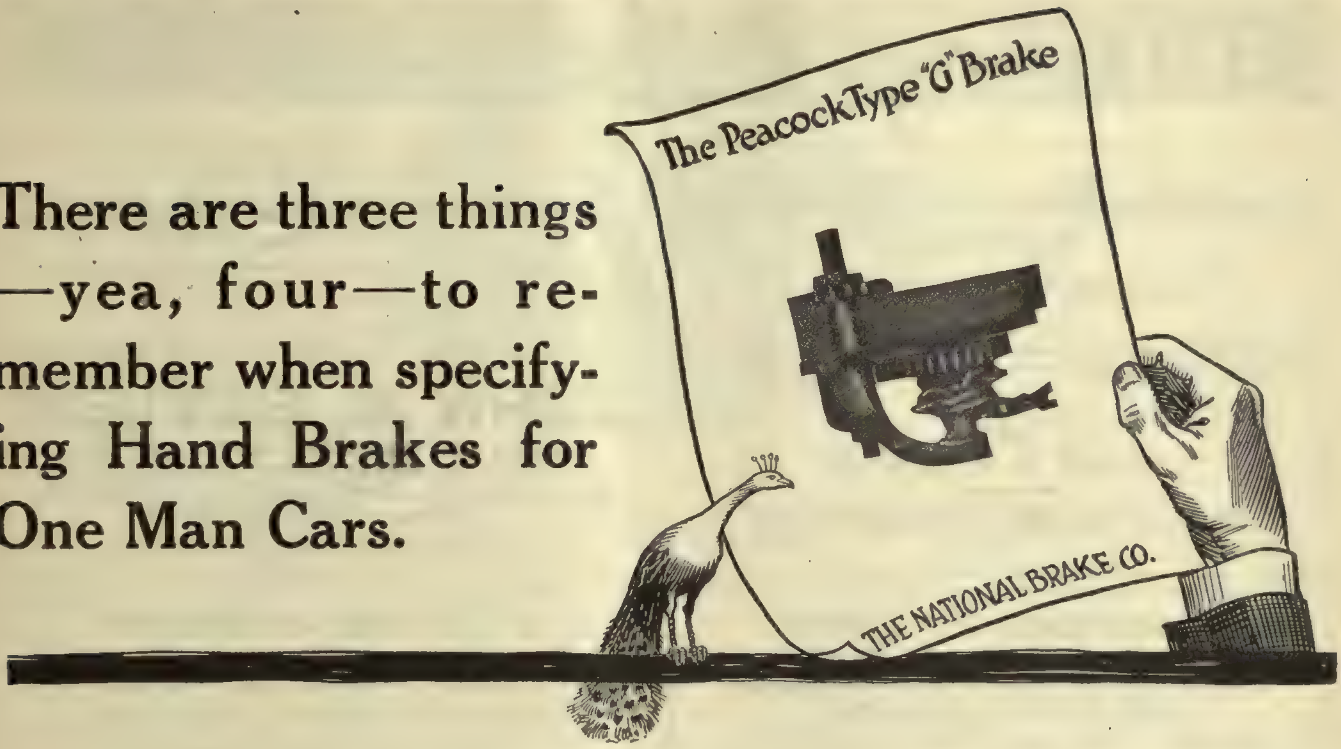
Fare Register.—"Time and Tide" is the title of a booklet distributed by the Ohmer Fare Register Company, Dayton, Ohio, describing the Ohmer fare register.

Reversible Seats.—The J. G. Brill Company, Philadelphia, has issued bulletin No. 246, which describes and illustrates the "Winner" and the "Waylo" types of Brill reversible seats.

Copper Wire, Cables, Etc.—The Copper Clad Steel Company, Rankin, Pa., Braddock post office, has issued five four-page leaflets covering its "Copperweld" bond wires for aerial cables, signal service, low-voltage power transmission and for power transmission and distribution.

Counters.—"Veeders Counters Checking Up Production" is the title of catalog No. 1901, issued by the Veeder Manufacturing Company, Hartford, Conn., describing its products, including cyclometers, odometers, counters, tachometers, fine die castings, etc.

There are three things—yea, four—to remember when specifying Hand Brakes for One Man Cars.


The Peacock Type "G" Brake
THE NATIONAL BRAKE CO.

Power:

The Peacock Type "G" Brake delivers more power for the initial effort than any other brake.

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The Peacock Brake is the Quickest by virtue of the Eccentric Winding Drum.

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The Peacock Type "G" Brake is made in a No. 5 Pitch tooth: therefore very light.

Price:

The Peacock Brake consists of only three principal parts, is simple in construction, light in weight, therefore low in price.

For One Man Cars, Specify Peacock Type "G" Brakes —That's all

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THE Erico is a high speed Railbonding Device. But two men are required to operate it and they can easily average 100 bonds per day, working comfortably.

And remember, high speed is not the only desirable feature of the Erico. It's also light in weight. It has no rotating parts. No flame or arc strikes bond or rail. It does not interfere with traffic. And its cost is low.

Put an Erico on the job. It will save money for you.

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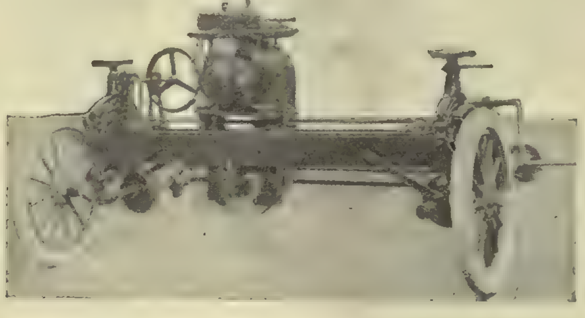
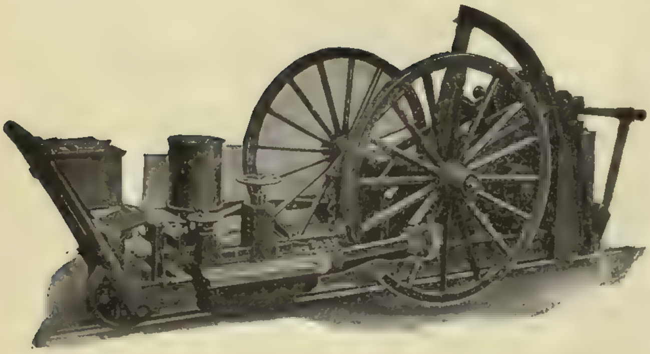
ELECTRIC RAILWAYS

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

THE SOLUTION OF YOUR TRACK GRINDING PROBLEMS





The solution of your track grinding problems lies in the continued use of one or more of the three Railway Trackwork Company's grinders.

If your rail is giving trouble from corrugations or badly cupped joints, the Reciprocating Track Grinder will best serve your needs.

If you are making extensive track repairs with an arc welding set, the Atlas Rail Grinder is essential for removing the surplus metal used in building up the low joints.

If you desire the best that is to be obtained in a grinder of the grinding wheel type and one that is up-to-date and reliable, specify the Universal Rotary Track Grinder.

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Concrete was never accused of having the property of

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You can put resiliency into this most excellent of road beds by the use of Dayton mechanical Ties.

The Asphalt cushion in this Resilient tie dissipates the shock of heavy traffic, and makes riding on concrete as easy as on pneumatic tires.

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THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

Lackawanna

Safety-head Angle Bars

prevent the sharp under corners of rail heads from breaking or weakening the bars and the joints

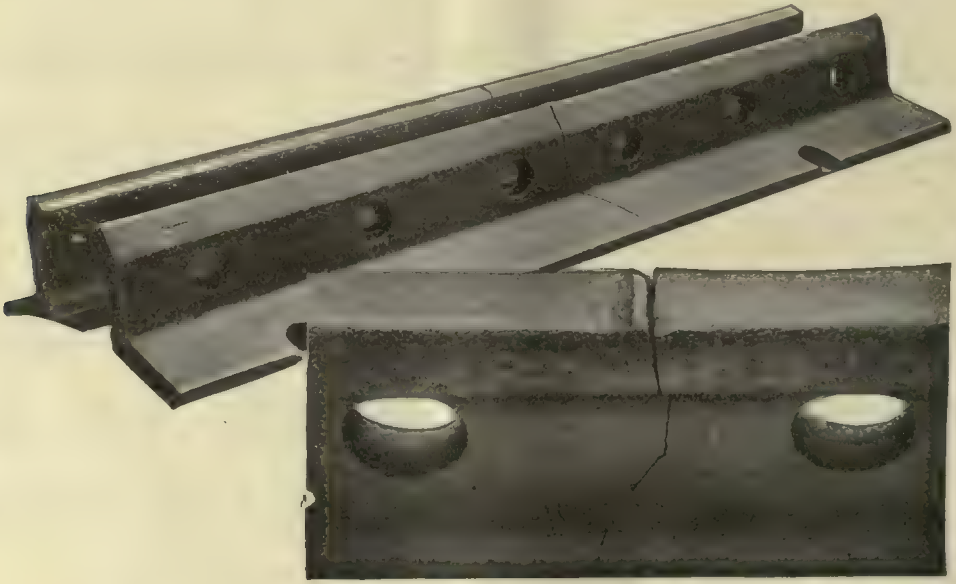
Breakage of angle bars in service results not always from inferior strength of metal but often from punishment of the bar that would be avoided with proper bar design.

It is well known that a bar or beam with its original skin metal unbroken will safely withstand heavier transverse stresses and consequently heavier loading than where the edge or flange is abraded. If the nick or abrasions in the metal surface are near the center of the beam and come under tension, the breakage will always develop at the nicked or abraded spot. An angle bar or splice bar on a rail joint is a peculiar illustration of this principle.

Under passing trains the rails are flexed downward under the rolling wheels, and then lifted or bent upward as the load passes the joint, the undulating motion being similar to that with a load traveling over thin ice.

This undulation or wave motion of the rails causes first a wearing or cutting of the angle bar at the top by the sharp under corners of the rail heads. Then when the upward thrust occurs as the wheel load passes, the head of the angle bar is brought into tension and a nicked or worn bar quickly develops into a broken joint with its consequent disaster. The prevention of this wear or notching of the angle bar at the center will eliminate the initial cause of broken bars.

That is exactly what is accomplished in the Lackawanna Safety-head Angle Bar. By depressing the metal slightly in the head of the bar at the center, contact with the sharp under corners of the rail heads is prevented. This depression is put into the bar while hot and therefore the original skin metal is preserved. The metal in the angle



Plain angle bar rail splice which fractured in service under back action from the wheel load. The wear which weakened the skin surface of these bars and aided in their fracture is plainly indicated. The safety depression of the Lackawanna Safety-head Angle Bar prevents this wear.

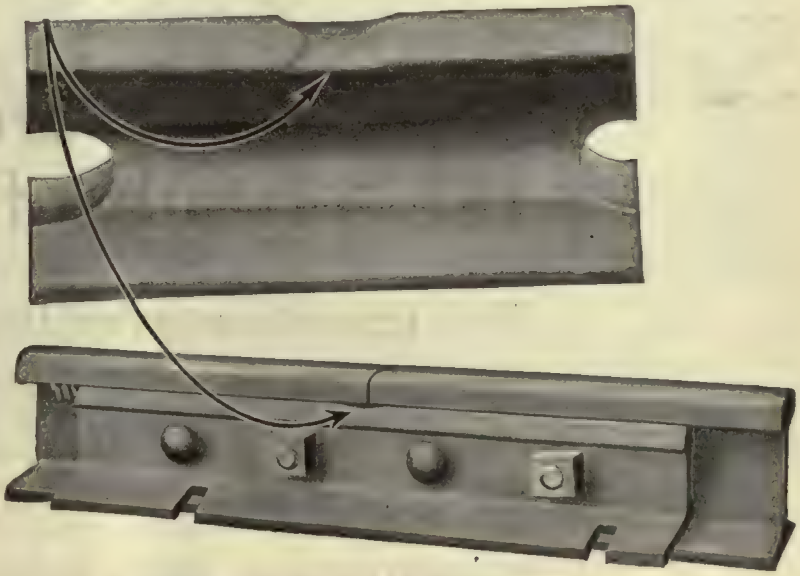
The Lackawanna Safety-head Angle Bar is *your own section* made break-proof

bar retains its tough rolled surface without wearing or upsetting under the action of the wheels at the joint. The bars are much better able to resist the upward flexure under passing loads.

The Lackawanna Safety-head Angle Bar therefore affords the following very definite advantages:

1. The "Safety-head" prevents cracking and weakening of the bar and the pounding of the joints out of surface.
2. The "Safety-head" prevents breaking of the bars and the danger which results therefrom, particularly on curves, where rending of the bars may so weaken the resistance of the rails against lateral thrust from wheel flanges that the ends of the rails may "lip" at the joint and cause derailment.

Let us figure with you on a trial installation on some stretch of track where these Safety-head Angle Bars would be given a severe test.



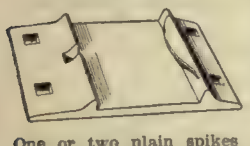
Lackawanna Safety-head Angle Bar and detail of the improved safety-head depression which prevents surface wear and cutting underneath the end of the rail head.

Other Lackawanna Aids to Better Track

The Lackawanna Deseaming Process

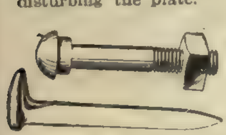
to which all our rails are subjected, leaves the rail head and base free from the cracks and weak, streaky, laminated, partially decarburized metal that under the ordinary manufacturing processes is an inherent cause of undue surface wear and rail fracture.

The Lackawanna Hook-Shoulder Tie Plate



is simple, strong, durable convenient for installation, and by holding the rail with great security prevents undue wear and destruction of material, saves repair costs and reduces maintenance labor.

Two ribs on top form a channel in which the rail base rests. One of the ribs is plain and the other hooked to make a holder One or two plain spikes on the plain rib complete the bond between plate and both rail flanges. The plate is fastened to the tie by independent plain or screw spikes. The rail may be removed without disturbing the plate.



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Our track bolts and spikes of all standard sizes for light or heavy rails, enjoy an enviable reputation for careful, accurate workmanship and finish.

The Abbott Rail-Joint Plate

The ABBOTT RAIL JOINT PLATE
"BUILT LIKE A BRIDGE"

strengthens and otherwise improves ordinary angle bar joints of standard and light tee and girder rails. Its use assures smooth running track surface without the necessity of constantly raising and tamping the joint ties, avoids annoyance and expense from worn and broken bolts and angle bars, and protects the rail ends from battering and breaking down.

The hard steel and combination of reversed flanging within the plate provides for internal stresses and imposes the load on the two joint ties with about the same action as between a short deck bridge and its piers. Upturned corner lugs engaging the ends of the angle bars act as anti-creepers and as rail guards to prevent misalignment if the angle bars break or become loose.

Abbott Plates are equally applicable to and advantageous on new or relaid track and will extend the life even of old track for several years.

These plates are made in types especially suitable for ordinary steam railway service for use in paved streets and for welding to the rail base and may be held with either screw or ordinary spikes.

Write for our booklets, "Lackawanna Deseamed Rails," "Lackawanna Improved Track Appliances," and "Lackawanna Track Bolts and Spikes."

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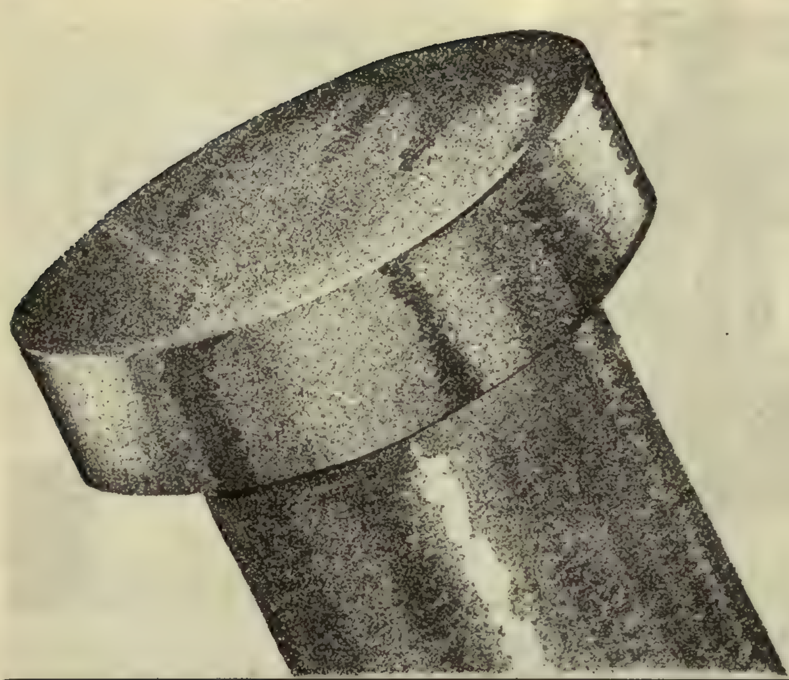

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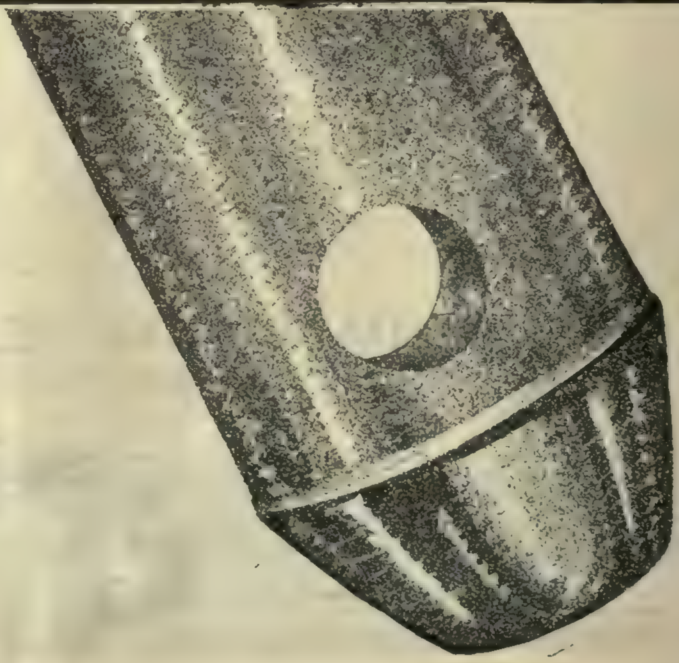

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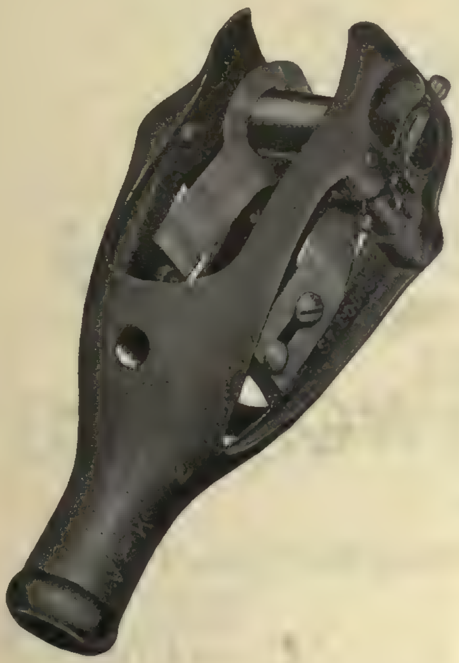

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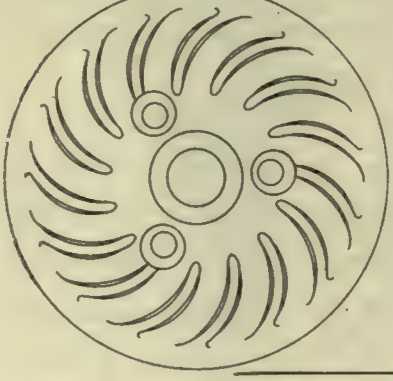

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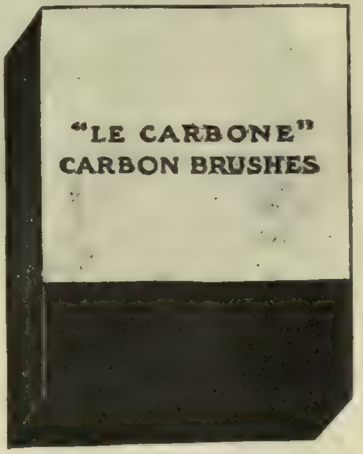

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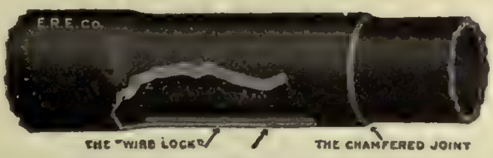

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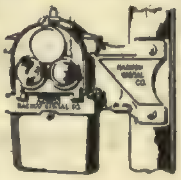

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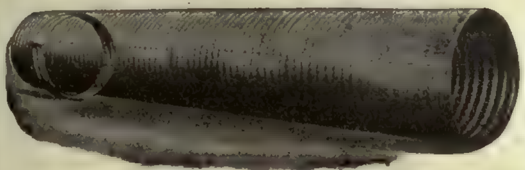

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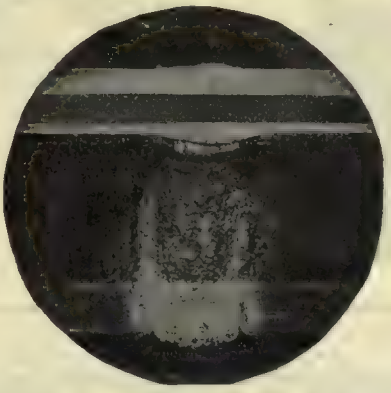

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The only method which prevents rail in paved track from cupping after years of service.

Send for Pamphlet 1232

METAL & THERMIT CORPORATION
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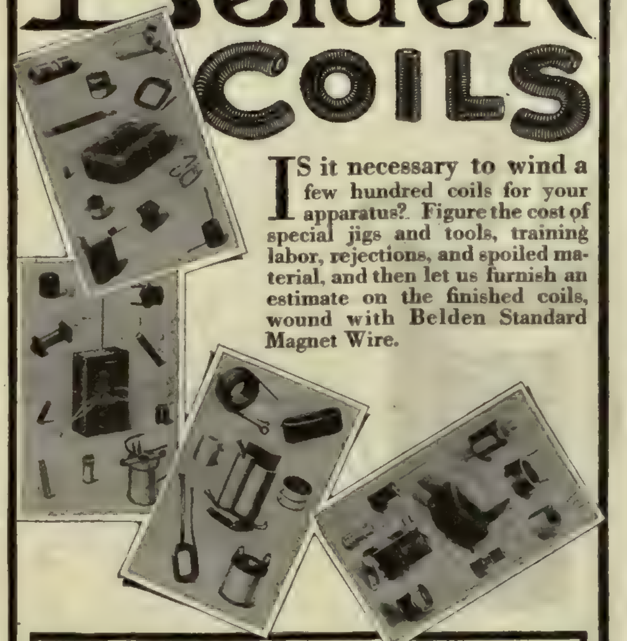
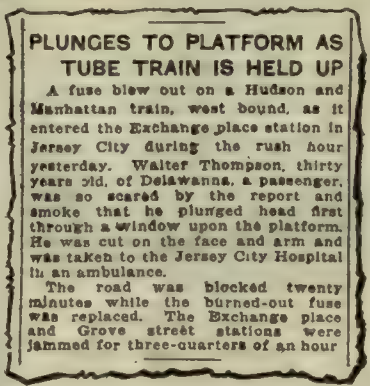
Belden COILS



IS it necessary to wind a few hundred coils for your apparatus?. Figure the cost of special jigs and tools, training labor, rejections, and spoiled material, and then let us furnish an estimate on the finished coils, wound with Belden Standard Magnet Wire.

BELDEN MANUFACTURING COMPANY
Twenty-third Street & Western Avenue
CHICAGO
Eastern Warehouse: Metuchen, N. J.



PLUNGES TO PLATFORM AS TUBE TRAIN IS HELD UP

A fuse blew out on a Hudson and Manhattan train, west bound, as it entered the Exchange place station in Jersey City during the rush hour yesterday. Walter Thompson, thirty years old, of Delawanna, a passenger, was so scared by the report and smoke that he plunged head first through a window upon the platform. He was cut on the face and arm and was taken to the Jersey City Hospital in an ambulance.

The road was blocked twenty minutes while the burned-out fuse was replaced. The Exchange place and Grove street stations were jammed for three-quarters of an hour

This could not have happened with

Atlas
4-in-1 Multiple Fuses

When an Atlas blows on short circuit, even on 600 volts, there is no noise, no flame, and no smoke. Why?—because of the patented silencer feature which smothers the arc, cools the temperature of the gases and reduces their pressure. Result; a silent blow.

Atlas Fuses are fool-proof and can be renewed only with self-contained elements; it is impossible to insert any metallic substance which will render inefficient the fuse as it is received from the factory.

Guaranteed to operate strictly in accordance with specifications for enclosed fuses as promulgated by Underwriters' and Factory Mutual Laboratories.

The approval labels

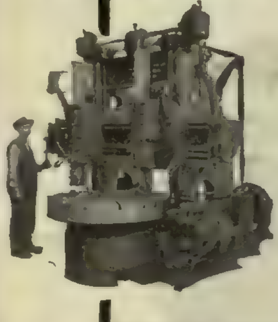
FM and UND. LAB. INSPECTED

insure perfect performance

Send for samples, prices, and comparative statement showing costs based on authentic laboratory tests.

Multiple Electric Products Co., Inc.
450 Fourth Ave., New York, N. Y.

NILES-BEMENT-POND CO.
111 BROADWAY, NEW YORK



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FOR ELECTRIC RAILWAYS

- **Axle Lathes**
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- **Boring Mills**
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for
Railroads - Contractors - Industries
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Templeton, Kenly & Co., Ltd.
Established 1899
London Chicago Paris

FORD TRIBLOC

A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 2½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

FORD CHAIN BLOCK CO.
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GREEN CHAIN GRATES

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GREEN ENGINEERING Co., East Chicago, Ind.

M-R INSULATION MFG CO

"Everything in Insulation"

Mica	Waxes
Vulcanized Fibre	Asphalts
Varnished Cloth	Compounds
Insulating Tapes	Insulating Varnish

The above are only a few of our products
Write us for anything in this line you may require.

MITCHELL-RAND M'F'G CO.
103 John St., New York City

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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WATER
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES

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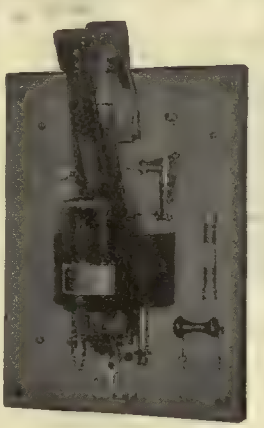
CIRCUIT BREAKERS
THE CUTTER CO., PHILADELPHIA

AUTOMATIC RECLOSING CIRCUIT BREAKER
"The Circuit Breaker With Brains"



KNOWS
Not Only When to Open

But Also
WHEN TO RECLOSE

And Does It
AUTOMATICALLY

For the Sake of Decreased Operating Costs and Complete Protection to Your Equipment and Service

"Let's Get Acquainted"

THE AUTOMATIC RECLOSING CIRCUIT BREAKER CO.
COLUMBUS, OHIO
Sole Manufacturers of Full Automatic Breakers.

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85 Liberty Street, New York
WATER TUBE STEAM BOILERS
Steam Superheaters Mechanical Stokers
Works: BARBERTON, OHIO—BAYONNE, N. J.
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BOSTON, 49 Federal St.
CHICAGO, Marquette Building
CINCINNATI, Traction Building
CLEVELAND, Guardian Building
DENVER, 435 Seventeenth St.
HAVANA, CUBA, Calle de Aguilar 104
HOUSTON, TEXAS, Southern Pacific Bldg.
LOS ANGELES, I. N. Van Nuys Bldg.
NEW ORLEANS, 533 Baronne St.
PHILADELPHIA, North American Bldg.
PITTSBURGH, Farmers' Deposit Bank Bldg
SALT LAKE CITY, 705-6 Kearns Bldg.
SAN FRANCISCO, Sheldon Bldg.
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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits
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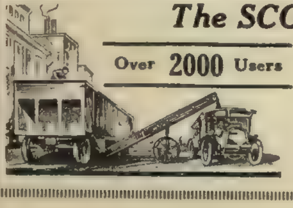
The SCOOP CONVEYOR



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For Storing and Reclaiming, Loading and Unloading Cars, Trucks and Wagons. Does the work of from 6 to 12 men and keeps equipment moving. Write for Literature
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THE TERRY TURBINE
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Type R-10
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International Fare Registers. Single registers, round and square; double registers, duplex counters, car fittings, foot-operating devices for single and double registers. Exclusive selling agents for Heeren enamel cap and coat badges.

The International Register Co.
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WE CAN CUT YOUR COST OF HEATING CURRENT
Write for THERMOSTATIC CONTROL INFORMATION

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ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
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LET US FIGURE ON YOUR NEXT REQUIREMENTS
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The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods.
The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

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high-grade R. R. Track and Car Jacks.

The Buckeye Jack Mfg. Co.
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It will pay you to investigate the possibilities of the saving Williams "Vulcan" System of Forged-Cutter Tool-Holders can effect in your shop.

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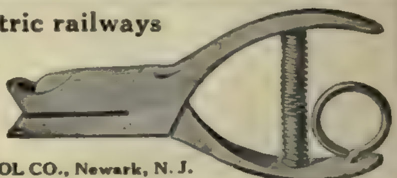
Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

The Cooper Heater Company
Carlisle, Pa.

75% of the electric railways
use
B-V Punches



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USE DIXIE CUP
Penny Vending Machines
To Solve their Drinking Cup Problems
in Cars and Stations
INDIVIDUAL DRINKING CUP COMPANY, INC.
HUGH MOORE, President
Original Makers of the Paper Cup — 220-230 W. 19th Street New York

"It Behooves You to Hooverize Your Motormen"

We can help you
Write to
The Arthur Power-Saving Recorder Co.
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The "Hycap-Exide" Battery
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STORAGE BATTERY
STREET CARS

THE ELECTRIC STORAGE BATTERY CO
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CARBON—GRAPHITE—METAL
BRUSHES
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Literature and detailed information sent upon request
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Branch Offices:
New York, Chicago, Philadelphia, St. Louis, Pittsburgh, Denver, Birmingham, San Francisco
Largest Miners of Graphite on This Continent

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Live salesmen in all electrical commodities can be located through the

"SEARCHLIGHT SECTION"

If you desire an agency or sales connection, use these columns.

8 cents a word. *Minimum $2.00 an insertion.*
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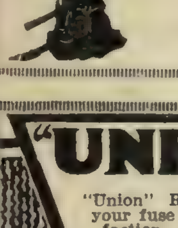
Use them in your terminals—
PEREY TURNSTILES
or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co., Inc.
30 Church Street, New York City

"UNION" FUSES
"Union" Renewable Fuses will save four-fifths of your fuse maintenance cost. Guaranteed to give satisfaction. Money back if they fail. Booklet on request.
CHICAGO FUSE
MFG. CO.
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DIFFERENTIAL
UTILITY CARS
Electric Railways!
GET FREIGHT BUSINESS!
For economy, use Differential Cars.
"If it is only a dump car it is not a Differential"
Differential Car
Company, Inc.
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The Kalamazoo Trolley Wheels
have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

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KALAMAZOO, MICH., U. S. A.

PROVIDENCE H-B
FENDERS LIFE GUARDS
The Consolidated Car Fender Co., Providence, R. I.
Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

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Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

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POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:
1 to 3 in., $4.50 an in.
4 to 7 in., $4.30 an in.
8 to 14 in., $4.10 an in.
15 to 29 in., $3.90 an in.
30 to 49 in., $3.80 an in.
50 to 99 in., $3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

CAR painters wanted for large interurban railroad. A man of experience thoroughly familiar with coach painting, who can push production, will have a permanent position and a good future. P-737, Elec. Ry. Journal.

ELECTRICAL engineer wanted, with some experience in street railway work, in city in Middle West; state experience, references, and salary desired when replying. P-605, Elec. Ry. Journal, Old Colony Bldg., Chicago.

GENERAL foreman of electric railway repair shop employing fifty men desires man experienced in modern overhauling and maintenance methods and capable of getting results; heavy interurban high-speed equipment; location Middle West; give full information in first letter. P-735, Elec. Ry. Journal, Old Colony Bldg., Chicago.

LARGE Interurban Railway is looking for man experienced in A. C. signaling on electric railways, who can take entire charge of signal department as Supervisor. Man with knowledge of telephones preferred; steady employment; good prospects. P-725, Elec. Ry. Journal, Old Colony Bldg., Chicago.

PERMANENT position open for several draftsmen with knowledge of street railway track work. New York Switch & Crossing Co., 15th and Madison Sts., Hoboken, N. J.

POSITIONS WANTED

ABLE engineering executive desires correspondence with officers or general managers of Class A or B property anticipating a change in personnel or type of organization; eight years' experience in design, erection, operation and maintenance of street and interurban railway rolling stock; five years' general operating experience; at present manager of a small property. PW-731, Elec. Ry. Journal, Old Colony Bldg., Chicago.

Summer Park Lighting
with Direct Current
We have for
Immediate Shipment
75-kw. Motor Generator Set.
D.C. Motor, 120-hp., 550/600-volt, 163 amp.
Direct connected to
A.C. Generator, 75-kw., 3-phase, 60-cycle, 6600-volt generator with 5-kw., 125-volt exciter, switchboard and instruments.
All Allis-Chalmers make.
Also 10-kva., 6600/110/220-volt transformer.
50,000 lb. 2/0 and 3/0 copper trolley wire.
Interurban Cars—Rails—Generators, etc., etc.
Write—Wire—Phone
ZELNICKER IN ST. LOUIS

POSITIONS WANTED

ELECTRICAL-MECHANICAL engineer, now employed, successful record, extended experience equipment, traffic, solicits inquiries from executives considering establishment research department per suggestion editorial Electric Railway Journal, Aug. 14. Good opportunity more important than present salary. PW-738, Elec. Ry. Journal.

RAILWAY electrical engineer, age 37, married, technical graduate; 13 years' experience location, construction, operation; intimately familiar with power plant operation, design and repair of rolling stock, overhead line (direct suspension and catenary), transmission and distribution. Accustomed to operation under Standard Code rules, understand schedule making and handling of trains; seeks position as electrical engineer with moderate or large interurban, or superintendent of smaller property; salary $3,000; prefer Eastern or Southern location. PW-739, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

YOUNG man, technically trained, now employed as chief electrician of large railway property in charge of substations, desires similar position elsewhere; will go anywhere; good references; best of reasons for changing. PW-734, Elec. Ry. Journal, Leader-News Bldg., Cleveland.

FOR SALE

4—All steel **Passenger Cars**, complete, mounted on Baldwin 18C trucks.

4—West. **Motors**, 328A.

Will be released about Nov. 1.

WESTMORELAND CO. RY. CO.
Derry, Pa.

New—Used—Rebuilt
MACHINERY AND SUPPLIES
for construction and industrial work.
READING ENGINEERING CO., INC.
154 Nassau St., New York

AGENTS AND SALESMEN

Salesmen Wanted

Sales agent wanted on commission basis to handle as a side line a product requiring no samples to carry but which product is an essential to all electric railways; large quantities should be used during the course of reconstruction; references exchanged. 978 Arcade, St. Louis, Mo.

FOR SALE

Stock for Sale

55 shares of stock in National Railway Appliance Co. of New York, at a bargain price. W. McK. White, 6712 Cornell Ave., Chicago, Ill.

FOR SALE
AT A BARGAIN
ALL THE
CARS
of The Blue Hill St. Ry.,
fully equipped, G. E. 80s,
800s and 1000s.

George Spaulding, Receiver
Canton, Mass.

IMMEDIATE DELIVERY

Twenty-Five Cycle Rotary Converters

2—300-kw. 3-phase, 25-cycle, 600-volt, General Electric rotary converters, complete with transformers, primary voltage 13,200, secondary 380-volts.

1—250-kw., 3-phase, 25-cycle, 600-volt, General Electric rotary converters, complete with transformers, primary voltage 13,200, secondary 380 volts.

Street Railway Motors

20—G. E. 800's, complete with controllers.

All in Splendid Condition

JOSEPH MYERSON, 411 Atlantic Ave., Boston 9, Mass.

Some One Wants to Buy

the equipment or machinery
that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it *Before* depreciation *Scraps* it.

0178

Machinery in Stock for
Immediate Shipment

ROTARY CONVERTERS

1—300 kw., Westg., 3-phase, 60-cycle, 370-v., A.C., 575-v., D.C., 600 r.p.m.
2—200 kw., G.E., 3-phase, 25-cycle, 85-v., A.C., 125-v., D.C., 8 pole, 375 r.p.m.

FREQUENCY CHANGER SETS

1—600 kva., Allis-Chalmers Frequency Changer Set, 300 r.p.m., 3-phase, 60-cycle, 2300-v. one end, 3-phase, 6600-v., 25-cycle on other end.
1—400 kw., G. E., 3-phase, 25-cycle, 6000-v. one side—2400-v., 2-phase, 60-cycle other side—375 r.p.m.

ARCHER & BALDWIN, INC.
114-118 Liberty Street, New York City
Telephone 4337-4338 Rector

FOR SALE

16 West. 56 Motors. 4 K-14 Controllers. 4 National type BB-4 Air Brake Equipments complete. 15 Double Truck Cars, 40-ft. long, mounted on Brill Trucks equipped with 4 GE-67 Motors, 2 K-6 Controllers, Air Brakes, etc., complete.

Electric Equipment Co.
Commonwealth Building, Philadelphia, Pa.

Fuller Steel & Iron Co.

Park Building
Pittsburgh, Pa.

New York Office, 115 Broadway

1500 tons New 60 lb. Open Hearth Billet Rolled Rail.
2500 tons New 70 lb. Open Hearth Billet Rolled Rail.
850 tons New 85 lb. Open Hearth Billet Rolled Rail.

With Angle Bars, Bolts, Nuts and Spikes
October Shipment

Let us have your inquiries.

5—Rotaries—300 K.W.

600 volt D.C., 25 cy. A.C. Trans. 15,000 volt, complete with Switchboards, Bood condition.

BARGAINS

Send for our used mach. list.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

FOR SALE

One Westinghouse

RAILWAY BOOSTER SET

600 volt to 250—182 volt 400 amp. on Booster side. One large lot of 500 volt motors.

C. G. & F. A. HUGH
10th and Walnut, St. Louis, Mo.

Caution—RAIL USERS

BUY NOW. There is a SCARCITY. We offer the following NEW RAILS for prompt shipment:

New 12-lb. and 30-lb. rails, splices, bolts and nuts.

New 90-lb. rails, angle bars, bolts, nuts and spikes.

They will be gone soon. Write or wire for our quotations.

Wire—300,000 lb. or more of copper trolley, feeder, high tension, etc.

A number of steel bridges on line of Cincinnati & Columbus Traction Co. For quick acceptance at $1.00 per 100 lb. as is. Photographs on request.

HYMAN-MICHAELS COMPANY

531 Peoples Gas Bldg., Chicago

BRANCH OFFICES: First National Bank Bldg., Pittsburgh, Pa.; Railway Exchange Bldg., St. Louis, Mo.; East Chicago, Ind.; New York: Woolworth Bldg.
YARDS AND WAREHOUSES: East Chicago, Ind. and St. Louis, Mo.

FOR SALE
Immediate Delivery

ROTARY CONVERTER

1—G. E., Type TC, 400 kw., 600 V., D.C., 370 volts A.C., 25 cycle. Fine condition. Subject to inspection.

J. M. WIKEL ENGINEERING CO.
1309 Union Trust Building, Cincinnati, O.

WORRYLESS ELECTRICAL REPAIRS

On all kinds and sizes A.C. or D.C. motors and generators, starters, welders, controllers, or anything electrical. Quick shipment from stock material, of coils commutators—shafts—bearings, etc. Remember our initials stand for our product.

CAREFUL CLEVELAND ACCURATE ARMATURE WORRYLESS WORKS, Inc.

EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND INC. 1918

Keep Your Eyes
on the
Searchlight
Section
and your
Ad in it

Passenger Cars and Snow Plows
FOR SALE

Twelve—34 Ft., Easy Access double truck cars—"M." Control—will furnish trucks and motors if desired and put cars in good operating condition.

Two Hundred—25 Ft., to 30 Ft., double truck closed cars with vestibules platform complete with trucks, motors "K" control—ready to run.

These cars can easily be rebuilt for PREPAYMENT operation if desired.

Two Hundred—12, 13, 14 and 15 Bench double truck open cars—in good condition—with equipment if desired—available for immediate delivery—and ready to run.

A number of single truck SHEAR SNOW PLOWS—equipped with motor—ready for next Winter's service
TERMS—Cash or easy payments—Car Trust Certificates if desired

EASTERN MASSACHUSETTS STREET RAILWAY CO.

Address Purchasing Dept. **No. 1 Beacon Street, BOSTON, MASS.**

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FOR IMMEDIATE SALE

GLOUCESTER, MASS.:

2—203 hp. B. & W. Water tube boilers
1—266 hp. B. & W. Water tube boiler
1—600 hp. B. & W. Water tube boiler
1—300 hp. 22 in. x 48 in. Harris-Corliss Single Engine
1—500 hp. 28 in. x 36 in. Hamilton-Corliss Single Engine
1—1500 hp. 30 in. x 48 in. x 48 in. Penn-Corliss Cross Compound Engine
1—250 kw. W. H. Belted Multipolar D.C. Generator
1—400 kw. G. E. Eng. Type Multipolar D.C. Generator
1—850 kw. G. E. Eng. Type Multipolar D.C. Generator
Switchboard and Misc. Auxiliary equipment

NEWBURY, MASS.:

3—115 hp. Kendall Horizontal Return Tubular Boilers
2—14 in. x 28 in. x 36 in. Slater-Corliss Cross Compound Engines
2—250 kw. W. H. Eng. type Multipolar D.C. Generators
Switchboard and Misc. Auxiliary equipment

ESSEX, MASS.:

2—150 hp. Kendall Horizontal Return Tubular boilers
1—150 hp. new eng. horizontal return tubular boiler
2—13 in. x 23 in. x 22 in. McIntosh & Seymour Tan. Com. High Speed Engines
2—220 kw. Walker Eng. Type Multipolar D.C. Generators
1—55 kw. G. E. Direct connected 200 volt Booster Set.
1—150 hp. New Eng. Boiler
Switchboard and Misc. Auxiliary equipment

LAKEVILLE, MASS.:

3—250 hp. A. & T. Water Tube Boilers
1—16 in. x 30 in. x 42 in. Hamilton-Corliss Cross Compound Engine
1—325 kw. W. H. Eng. Type Multipolar D.C. Generator
Switchboard and Misc. Auxiliary equipment

SALEM, MASS.:

1—2500 A.B.H. G. E. Curtis Horizontal 60 Cycle. 445 volts A.C. Turbo. Generator and Direct connected Exciter
1—Alberger Spiroflo jet condenser and Auxiliaries.

HYDE PARK, MASS.:

3—500 hp. B. & W. Water Tube Boilers
1—1500 hp. 30½ in. x 52 in. x 48 in. Penn Cross Compound Engine
1—750 hp. 20 in. x 40 in. x 48 in. Greene Cross Compound Engine
1—700 hp. 20 in. x 40 in. x 42 in. Penn. Cross Compound Engine
1—850 kw. G. E. Direct Connected D.C. Generator
1—525 kw. G. E. Direct Connected D.C. Generator
1—500 kw. G. E. Direct Connected D.C. Generator
Condensers, Pumps, Blowers, Boosters, Switchboard and Miscellaneous Auxiliary equipment.

Inspection Solicited—Details upon Application.

Terms Cash or Easy Payments. Car Trust Certificates if Desired.
Equipment released on account of purchasing power.

EASTERN MASSACHUSETTS ST. RY. COMPANY

Address Purchasing Dept. **1 Beacon Street, Boston, Mass.**

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80 lb. RAIL & ACCESSORIES

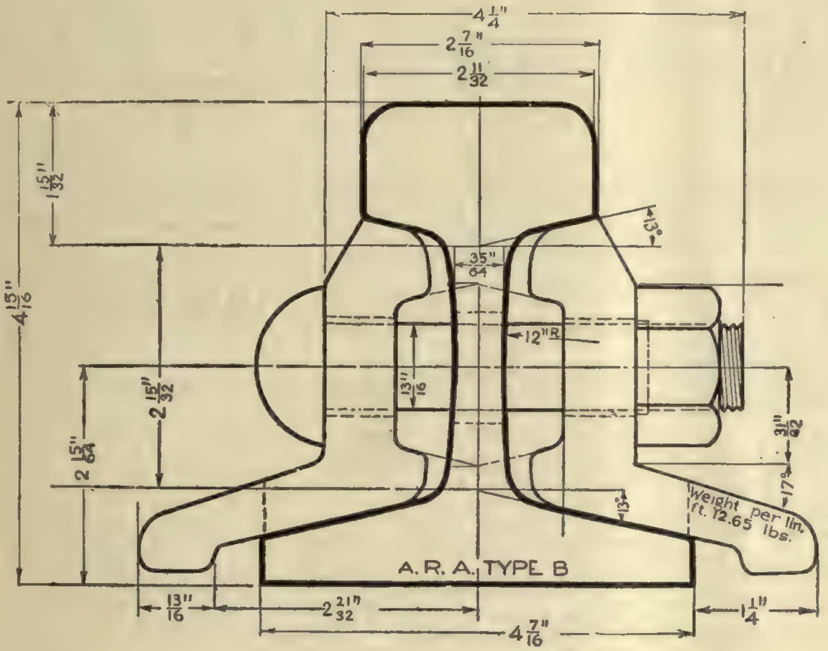
ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

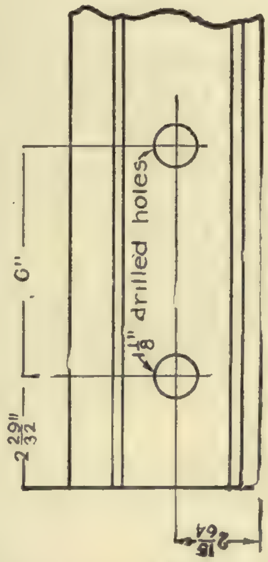
For Sale

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.





Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

We buy electric and steam railways that are to be dismantled

St. Louis Office
2115 Railway Exchange Building

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
- Collier, Inc., Barron G.

Air Aftercoolers
- Ingersoll-Rand Co.

Air Receivers
- Ingersoll-Rand Co.

Ammeters
- Weston Electrical Instrument Co.

Anchors, Guy
- Electric Service Supplies Co.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Angle Bars
- Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
- Green Engineering Company

Automobiles and Buses
- Brill Co., The J. G.

Axles
- Bemis Car Truck Co.
- St. Louis Car Co.

Axle Straighteners
- Columbia M. W. & M. I. Co.

Axles, Car Wheel
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Carnegie Steel Co.
- Standard Steel Works Co.
- Westinghouse Elec. & Mfg. Co.

Babbitt Metal
- More-Jones Brass & Metal Co.

Babbitting Devices
- Columbia M. W. & M. I. Co.

Badges and Buttons
- Electric Service Supplies Co.
- International Register Co., The

Batteries, Dry
- Johns-Manville Co., H. W.

Batteries, Storage
- Electric Storage Battery Co.

Bearings and Bearing Metals
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- More-Jones Brass & Metal Co.
- St. Louis Car Co.
- Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
- Stucki Co., A.

Bells and Gongs
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- St. Louis Car Co.

Benders, Rail
- Niles-Bement-Pond Co.

Boilers
- Babcock & Wilcox Co.

Bond Testers
- American Steel & Wire Co.
- Rail Welding & Bonding Co.

Bonding Apparatus
- American Steel & Wire Co.
- Electric Railway Improvement Co.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Rail Welding & Bonding Co.

Bonds, Rail
- American Steel & Wire Co.
- Copper Clad Steel Co.
- Electric Railway Improvement Co.
- Electric Service Supplies Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Ohio Brass Co.
- Rail Welding & Bonding Co.
- Westinghouse Elec. & Mfg. Co.

Book Publishers
- McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
- Niles-Bement-Pond Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
- Bates Expanded Steel Truss Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Hubbard & Co.
- Ohio Brass Co.

Brake Adjusters
- National Ry. Appliance Co.
- Westinghouse Traction Brake Co.

Brake Shoes
- Amer. Brake Shoe & Fdry. Co.
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- National Brake Co.
- Safety Car Devices Co.
- St. Louis Car Co.
- Westinghouse Traction Brake Co.

Bricks, Fire
- Green Engineering Co.

Brooms, Track, Steel or Rattan
- Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
- Corliss Carbon Co.
- General Electric Co.
- Jeandron, W. J.
- United States Graphite Co.
- Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
- United States Graphite Co.

Brush Holders
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.

Bushings, Case Hardened and Manganese
- Bemis Car Truck Co.

Bushings, Graphite and Wooden
- Bound Brook Oilless Bearing Co.

Cables (See Wires and Cables)

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
- Westinghouse Elec. & Mfg. Co.

Cars, Dump
- Differential Car Co.

Cars, Passenger, Freight, Express, etc.
- American Car Co.
- Brill Co., The J. G.
- Kuhlman Car Co., G. C.
- McGuire-Cummings Mfg. Co.
- National Ry. Appliance Co.
- St. Louis Car Co.
- Wason Mfg. Co.

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- Electric Equipment Co.

Cars, Self-Propelled
- Electric Storage Battery Co.
- General Electric Co.

Castings, Brass, Composition or Copper
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
- American Steel Foundries
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Standard Steel Works Co.
- St. Louis Car Co.

Castings, Malleable and Brass
- Amer. Brake Shoe & Fdry. Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

Catchers and Retrievers, Trolley
- Ackley Brake & Supply Corp.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Wood Co., Chas. N.

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- Automatic Reclosing Circuit Breaker Co.
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- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

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- Anderson Mfg. Co., A. & J. M.
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- Electric Service Supplies Co.
- Eureka Co.
- General Electric Co.
- Hubbard & Co.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

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- Brill Co., The J. G.
- Ohio Brass Co.

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- General Electric Co.

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Coil Banding and Winding Machines
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

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- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Independent Lamp & Wire Co.
- Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

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- International Register Co., The
- Johnson Fare Box Co.

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- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

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- General Electric Co.

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- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

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- Chicago Pneumatic Tool Co.
- General Electric Co.
- Ingersoll-Rand Co.
- Westinghouse Trac. Brake Co.

Compressors, Gas
- Ingersoll-Rand Co.

Condensers
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

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- Chicago Fuse Mfg. Co.

Conduits, Underground
- Johns-Manville Co., H. W.

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- Westinghouse Elec. & Mfg Co.

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- Russell Mfg. Co.

Controllers or Parts
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Russell Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

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- General Electric Co.
- Westinghouse Elec. & Mfg. Co

Converters, Rotary
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

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- Portable Machinery Co.

Conveyors, Coal and Ash
- Green Eng. Co.
- Portable Machinery Co.

Conveyors, Portable
- Portable Machinery Co.

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- Green Eng. Co.
- Portable Machinery Co.

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- Anaconda Copper Mining Co.
- Copper Clad Steel Co.

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- Electric Service Supplies Co.
- International Register Co., The
- Roebling's Sons Co., John A.
- Samson Cordage Works
- Silver Lake Co.

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- Electric Service Supplies Co.
- Samson Cordage Works
- Wood Co., Chas. N.

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- Brill Co., The J. G.
- Ohio Brass Co.
- Westinghouse Trac. Brake Co.

Cranes
- Niles-Bement-Pond Co.

Creosote
- Barrett Co., The

Creosoting
- Barrett Co., The

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Crossing Signals (See Signals, Crossing)

Crossings, Frog and Switch
- Wharton, Jr., & Co., Wm.

Crossings, Track (See Track, Special Work)

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- Armco Iron Culvert & Flume Mfg. Assn.
- Canton Culvert & Silo Co.
- Stark Rolling Mill Co.

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- Brill Co., The J. G.
- Electric Service Supplies Co
- St. Louis Car Co.

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- Chicago Fuse Mfg Co.

Dealers' Machinery
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- Electric Equipment Co.
- Foster Co., L. B.
- Hyman Michaels Co.

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- Cleveland Frog & Crossing Co.
- Wharton, Jr., & Co., Wm.

Destination Signs
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- Electric Service Supplies Co.

Detective Service
- Wish Service, P. Edward

Dogs, Lathe
- Williams & Co., J. H.

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- Consolidated Car Heating Co.
- National Pneumatic Co., Inc.
- Safety Car Devices Co.

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- Brill Co., The J. G.
- General Electric Co.

Doors, Folding Vestibule
- National Pneumatic Co., Inc.

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- Ingersoll-Rand Co.

Drills, Track
- American Steel & Wire Co.
- Chicago Pneumatic Tool Co.
- Electric Service Supplies Co.
- Niles-Bement-Pond Co.
- Ohio Brass Co.

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- Individual Drinking Cup Co., Inc.

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- Zelnicker Supply Co., Inc., Walter A.

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- Roebling's Sons Co., J. A.

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- Archbold-Brady Co.
- Arnold Co., The
- Byllesby Co., Inc., H. M.
- Clark Management Corp., E. W.
- Engel & Hevenor
- Feustel, Robert M.
- Ford, Bacon & Davis
- Hemphill & Wells
- Holst, Englehardt W.
- Jacobs & Co., J. L.
- Jackson, Walter
- Kelly-Cooke & Co.
- Parsons, Klapp, Brinkerhoff & Douglas
- Republic Engineers, Inc.
- Richey, Albert S.
- Robinson & Co., Dwight P.
- Sanderson & Porter
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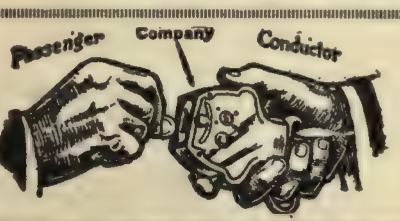

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- Cleveland Fare Box Co.
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- Johns-Manville Co., H. W.
- Westinghouse Elec. & Mfg. Co.

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- American Mason Safety Tread Co.

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- Eureka Co.
- Standard Steel Works Co.
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- General Electric Co.
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- Railway Track-work Co.

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- Electric Service Supplies Co.
- Ohio Brass Co.

Harps, Trolley
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
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- Star Brass Works

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- General Electric Co.
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- Electric Service Supplies Co.
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- Ohio Brass Co.

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- Electric Ry. Equipment Co.
- Electric Service Supplies Co.
- General Electric Co.
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- Mitchell-Rand Mfg. Co.
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- Electric Service Supplies Co.
- General Electric Co.
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- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

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- Niles-Bement-Pond Co.

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- General Electric Co.
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- Ohio Brass Co.
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- Barrett Co., The

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- Barrett Co., The

Pickups, Trolley Wire
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- Ohio Brass Co.

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- General Electric Co.
- Wood Co., Chas. N.

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- Westinghouse Traction Brake Co.

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- Standard Steel Works Co.
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- Electric Railway Equipment Co
- Hubbard & Co.

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- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Nuttall Co., R. D.

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- Electric Railway Equipment Co.

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- International Register Co., The
- Wood Co., Chas. N.

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- Electric Service Supplies Co.
- McGuire-Cummings Mfg. Co.
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- Electric Service Supplies Co.
- International Register Co., The
- Rooke Automatic Register Co.

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- Carnegie Steel Co.

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- Columbia M. W. & M. I. Co.
- General Electric Co.
- Independent Lamp & Wire Co.
- Westinghouse Elec. & Mfg. Co.

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- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

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Resistance, Wire and Tube
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

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- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

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- Barrett Co., The

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- Belden Mfg. Co.

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- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Ohio Brass Co.
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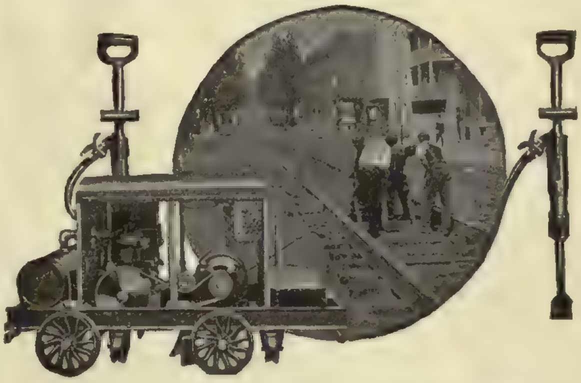

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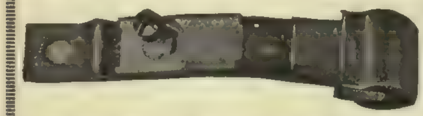

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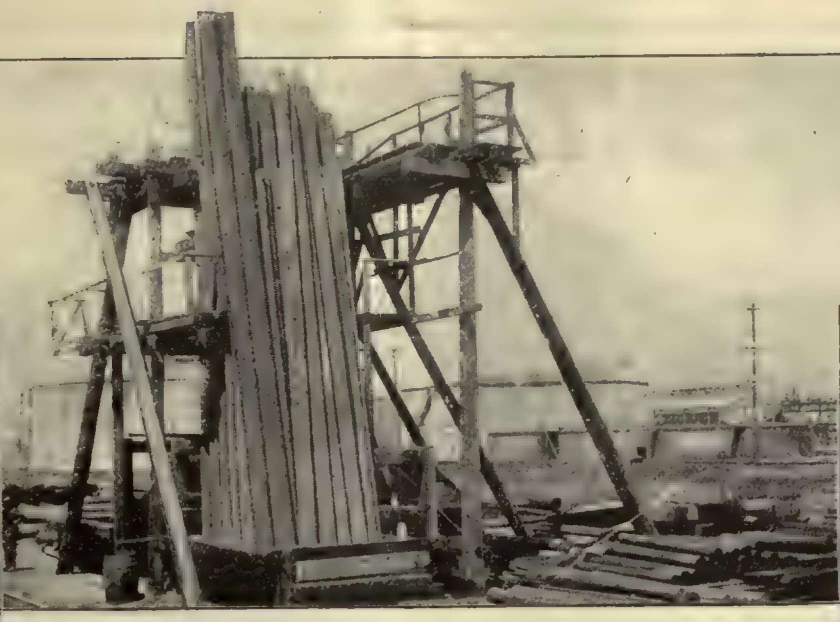
Below: Illustration of the great amount of decay of trolley poles at the ground line.



Open Tank process carbosoting plant of Southern California Edison Company. Simple, effective, economical tanks with a capacity of 75 to 150 poles each day.

Below: Trolley pole decayed immediately above the ground line. The balance of the pole above ground can be salvaged.

Pole Salvaging and Timber Conservation—

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Carbosota

Grade-One Liquid

Creosote Oil

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This plant is simple but very efficient. It consists of two treating tanks 9 feet wide, 9 feet long and 11 feet deep; scaffolding, working platforms, derrick, piping, valves, pump, and two 10,000 gallon storage tanks. Carbosota is purchased in tank cars, thus insuring the lowest price. The capacity of the plant is from 75 to 150 poles (depending upon their size) per day.

Plants of this type, with capacities varying from 2,000 poles per year up, can be installed at surprisingly low cost.

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(Green wood cannot be effectively creosoted by non-pressure processes. It should be seasoned. In regions of moist, warm climate, wood of some species may start to decay before it is completely air-dry. Exception should be made in such cases and treatment modified accordingly.)

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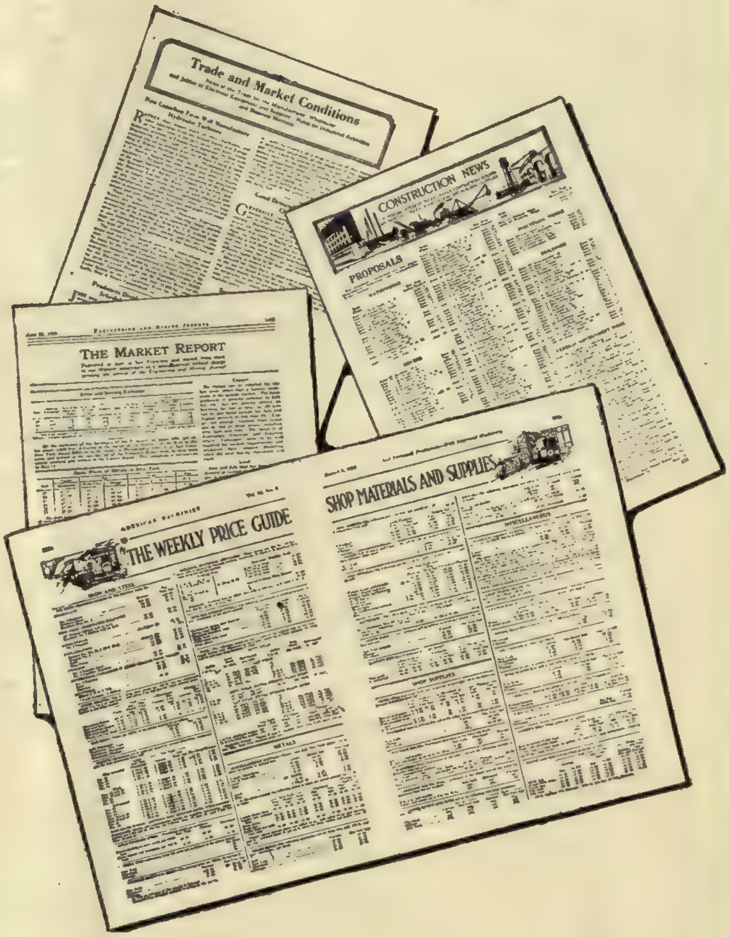
How to Think Straight about Business



WHAT is going to happen tomorrow is the vital thing that affects what business men are doing today. There are five sets of facts on which business men make up their minds.

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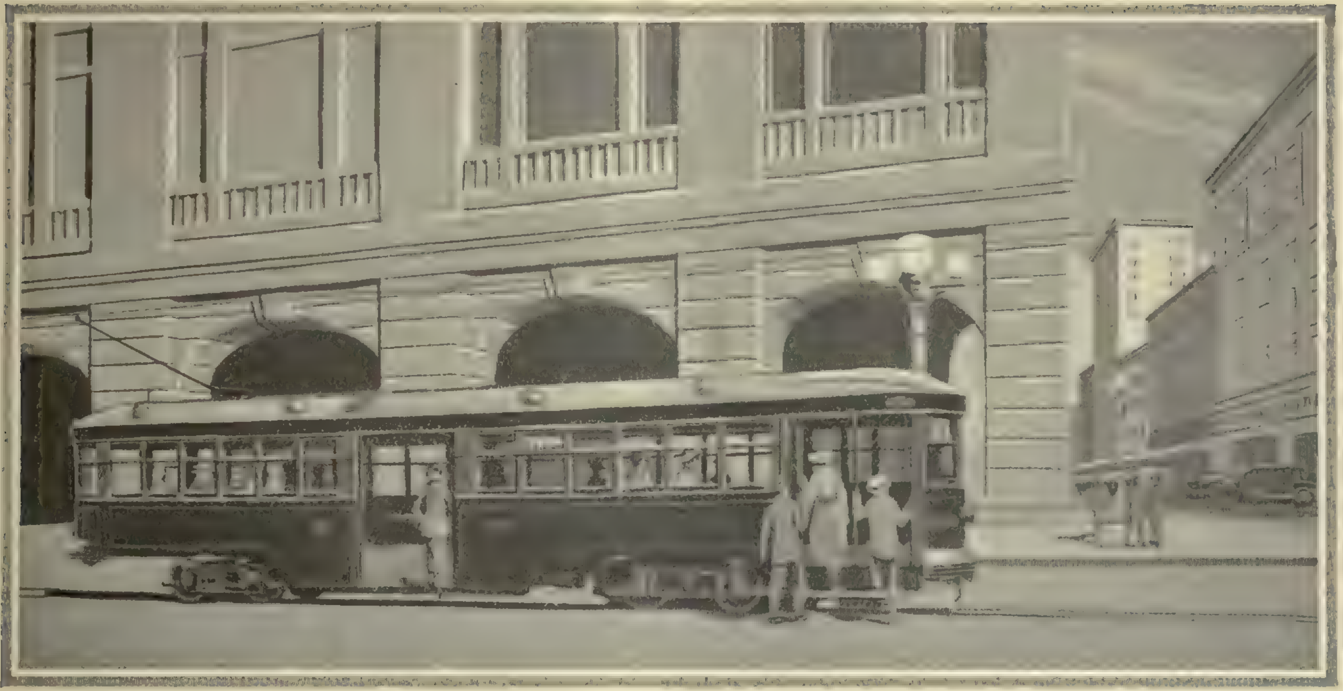

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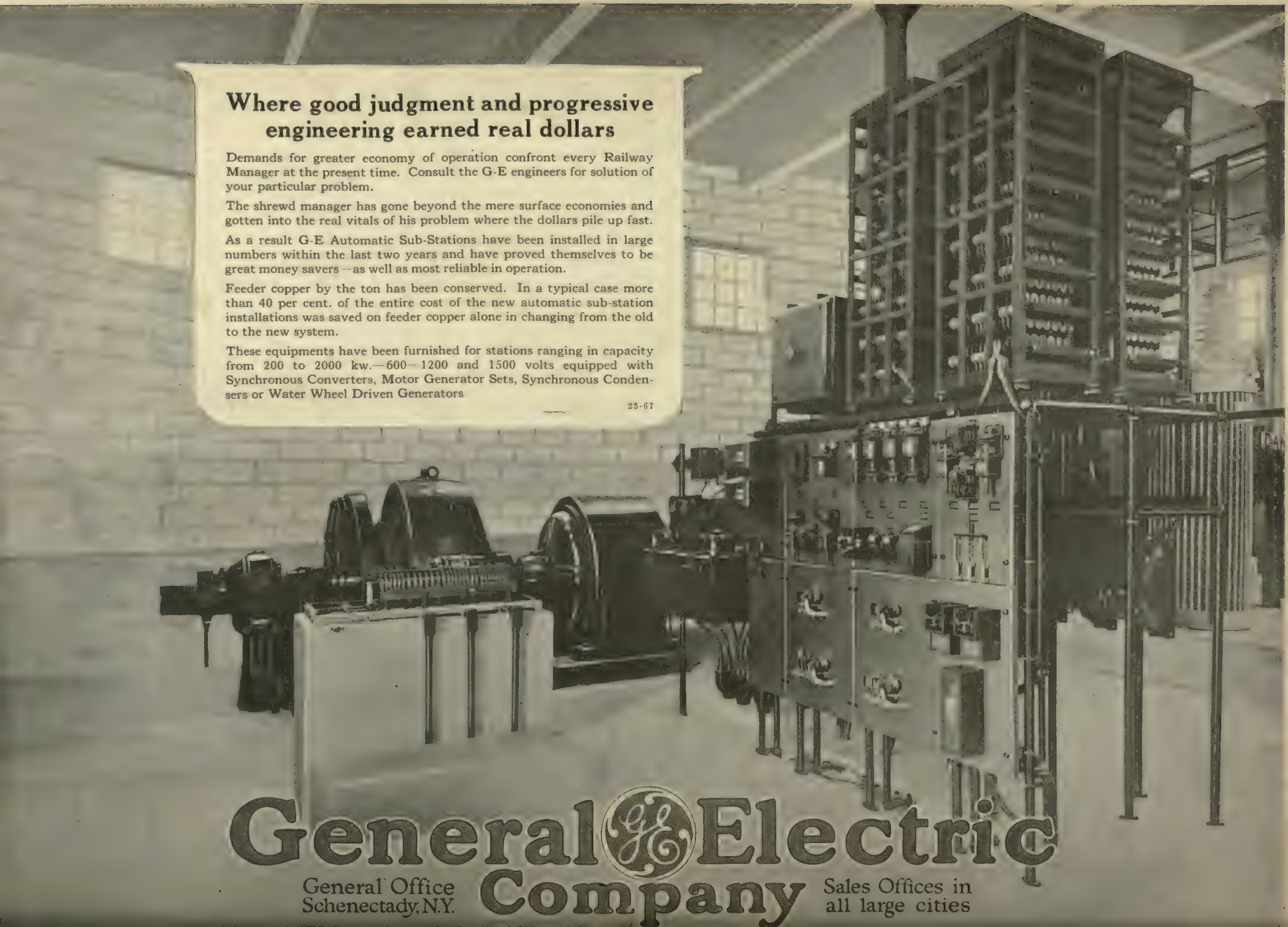
Then there is no delay in the fare collection. The conductor is located on the forward side of the center doors and collects fares only when passengers pass him. Therefore those passing to the rear of the car pay as they enter while those remaining in the forward end pay as they leave. This equally distributes the fare collection and relieves congestion at both loading and unloading points.

The Peter Witt Car is a city type where heavy traffic demands quick loading and unloading.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.



Where good judgment and progressive engineering earned real dollars

Demands for greater economy of operation confront every Railway Manager at the present time. Consult the G-E engineers for solution of your particular problem.

The shrewd manager has gone beyond the mere surface economies and gotten into the real vitals of his problem where the dollars pile up fast.

As a result G-E Automatic Sub-Stations have been installed in large numbers within the last two years and have proved themselves to be great money savers—as well as most reliable in operation.

Feeder copper by the ton has been conserved. In a typical case more than 40 per cent. of the entire cost of the new automatic sub-station installations was saved on feeder copper alone in changing from the old to the new system.

These equipments have been furnished for stations ranging in capacity from 200 to 2000 kw.—600—1200 and 1500 volts equipped with Synchronous Converters, Motor Generator Sets, Synchronous Condensers or Water Wheel Driven Generators

25-67

General Electric Company

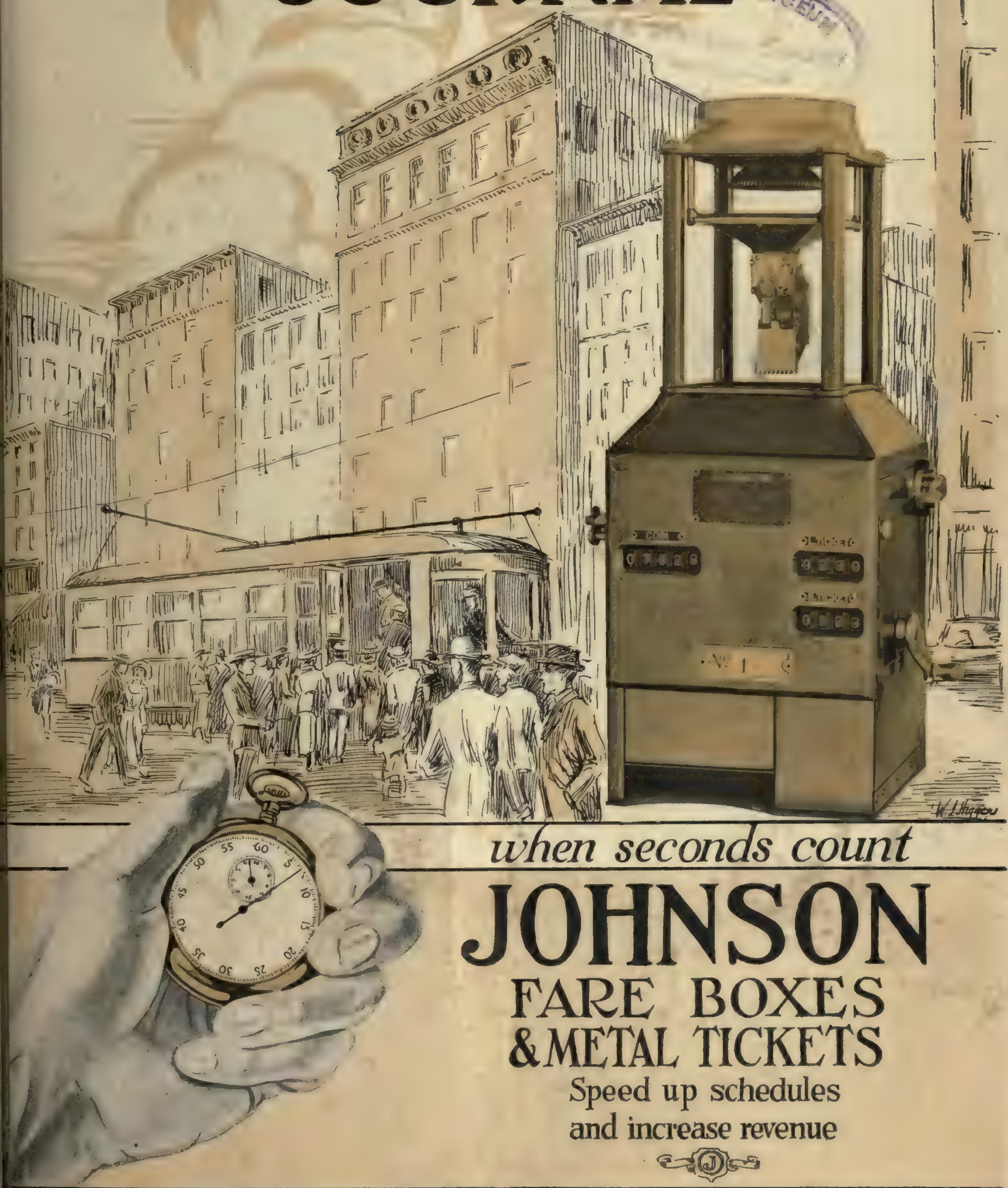
General Office
Schenectady, N.Y.

Sales Offices in
all large cities

cGraw-Hill Co., Inc. *Monthly Mechanical and Engineering Edition* September 18, 1920

ELECTRIC RAILWAY JOURNAL

LYCEUM

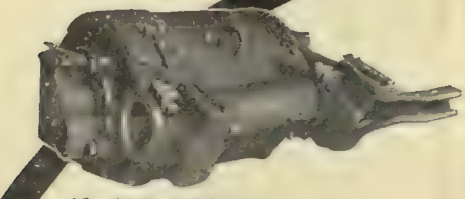


when seconds count

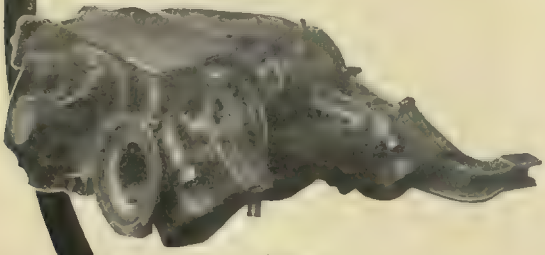
JOHNSON
FARE BOXES
&METAL TICKETS
Speed up schedules
and increase revenue

OHNSON FARE BOX COMPANY 4619-25 E. Ravenswood Ave., Chicago.

Modern Efficiency and Economy


No. 508-A Motor
25 H.P. - 1035 Lbs.

No. 514 Motor
40 H.P. - 1700 Lbs.


No. 532 Motor
50 H.P. - 2325 Lbs.

No. 306 Motor
65 H.P. - 2700 Lbs.

Efficiency today means frequent, regular and reliable service. The people demand it.

Old motor equipments mean failures in service, which means delays and dissatisfied patrons. Efficiency and economy are obtained by replacing obsolete motors with up-to-date designs. Aside from reduced maintenance, the economy assured in weight reduction alone, justifies the investment.

H.P.	Old Motors	Modern Motors
25	2,270 lbs.	1,035 lbs.
40	2,280 "	1,700 "
50	2,780 "	2,325 "
65	3,000 "	2,700 "

Replace with Westinghouse, Modern Motors, and obtain the advantages of weight reduction, high, continuous capacity and superior commutation.

W
WESTINGHOUSE ELECTRIC

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

Vol 56, *No.* 12 New York, September 18, 1920 *Pages* 529-578

Electric Railway Journal

Henry W. Blake and Harold V. Bozell, Editors Henry H. Norris, Managing Editor

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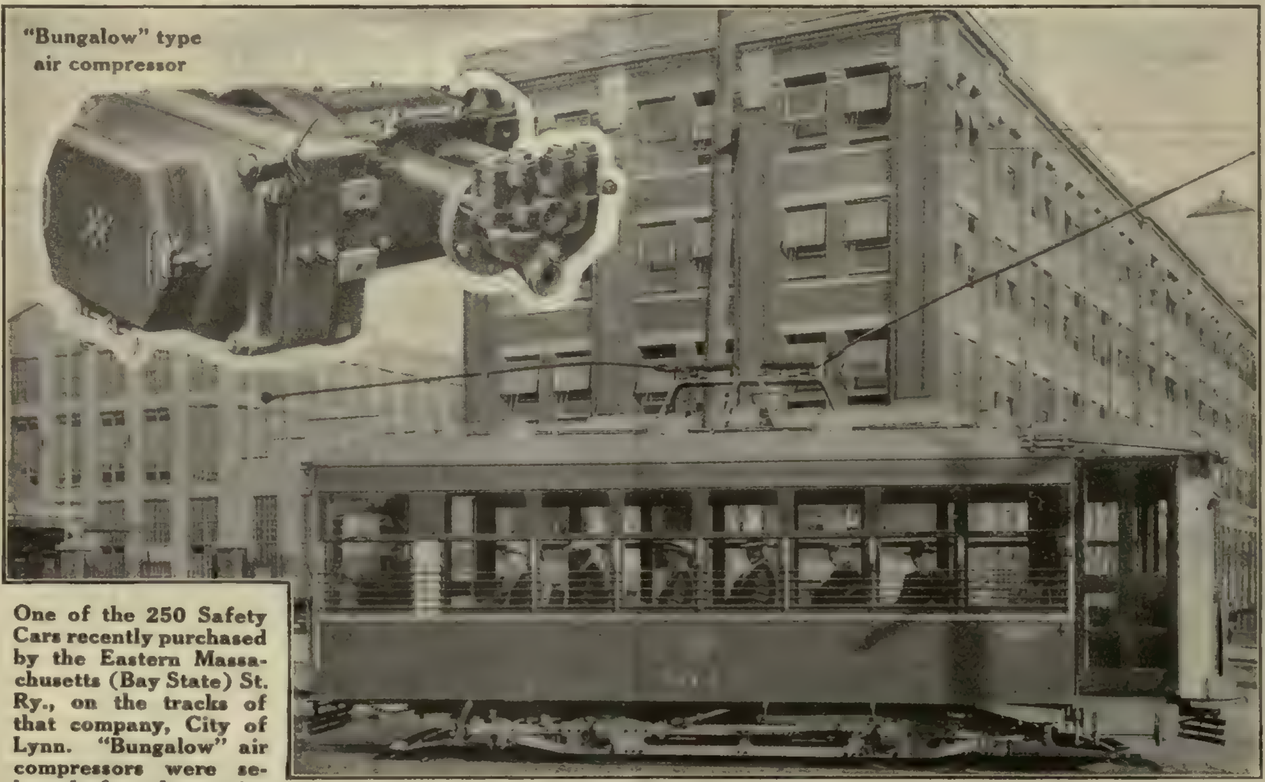

"Bungalow" type air compressor

One of the 250 Safety Cars recently purchased by the Eastern Massachusetts (Bay State) St. Ry., on the tracks of that company, City of Lynn. "Bungalow" air compressors were selected for the entire 250 cars.

The Superior Merits of Bungalow Air Compressors Place 250 on Largest St. Ry. Line

The Public Trusteeship managers of the Eastern Massachusetts (Bay State) St. Ry., having in mind the best interest of the traveling public, also recognizing the superior merits of the Bungalow Air Compressor, have selected Bungalow Air Compressors on its recent orders for 250 Safety cars. The compact, low-built design and its highly satisfactory performance, especially adapt the "Bungalow" air compressor to "Safety" car service. It has been included in all the largest installations. Over 3306 Safety Cars now running on 185 different electric lines throughout the United States are equipped with Bungalow air compressors.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

New York
San Francisco

Washington

Chicago
St. Louis

And the Mayor of Terre Haute said:

(To inquirers from Chicago)

"AS Mayor of Terre Haute, and resident of Terre Haute for 48 years, I take great pleasure in recommending to any city in need of street-car service the one-man cars. They are proven to be very satisfactory in Terre Haute, and the public would not care to change back to the old style. They are quick to stop and quick to start and no danger of anyone getting hurt by getting on and off the car, as the door does not open until the car stops, and the car does not start until the doors close. They don't seem to have any trouble in making change quick or issuing transfer. We have about 50 of them in operation, and they are giving good satisfaction and good service and we have no complaints from the public."

They are genuine Safety Cars, of course

because they are equipped with automatic, laborless apparatus, so interlocked that regardless of the illness or distraction of the operator the power will be cut off instantaneously, the airbrakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, they are Safety Cars only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

SAFETY CAR DEVICES COMPANY

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO
Railway Exchange Bldg.

WASHINGTON, D. C.
Munsey Bldg.

NEW YORK
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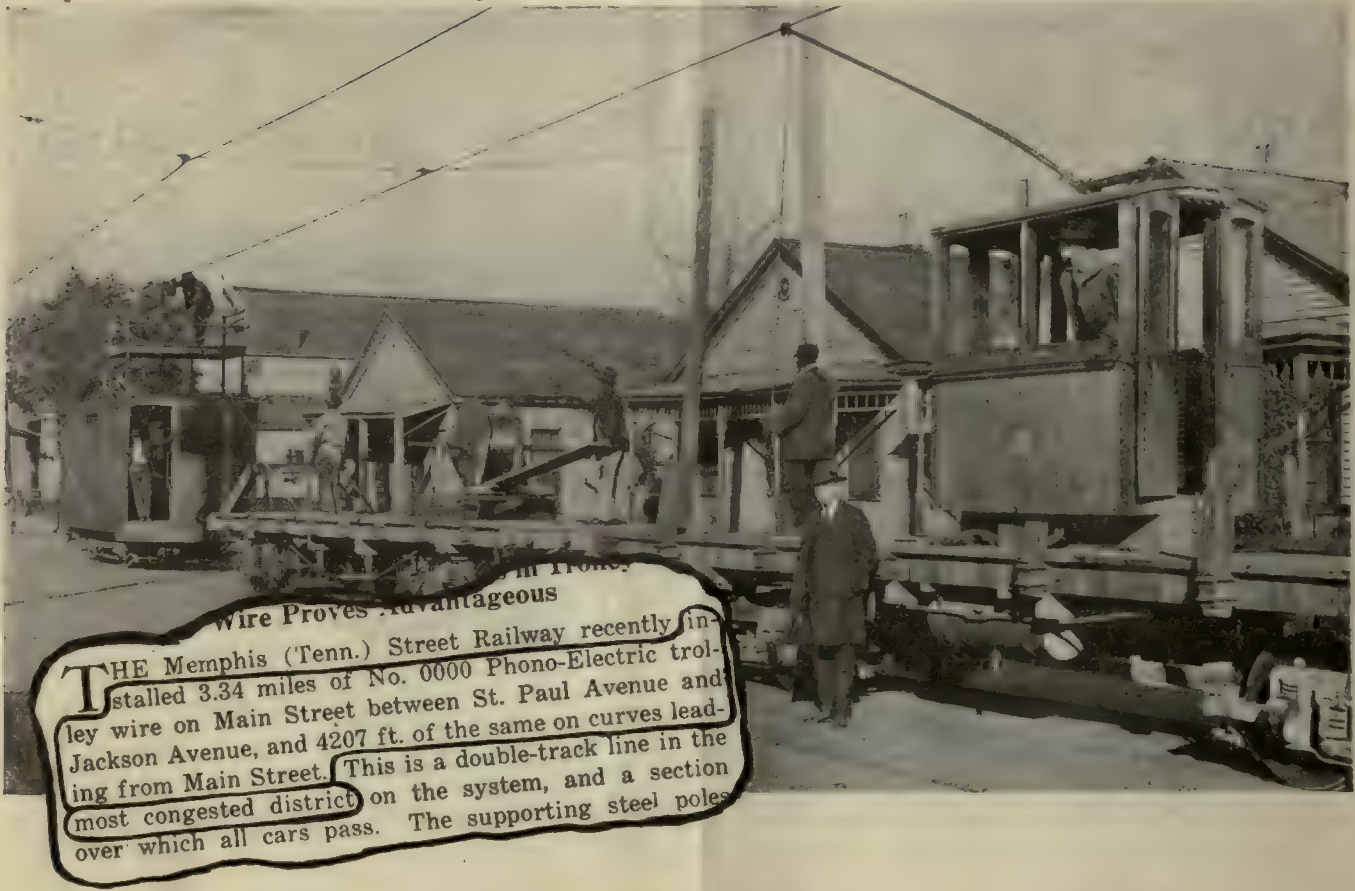
PITTSBURGH
Westinghouse Bldg.

SAN FRANCISCO
Southern Pacific Bldg.

CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.



Wire Proves Advantageous

THE Memphis (Tenn.) Street Railway recently installed 3.34 miles of No. 0000 Phono-Electric trolley wire on Main Street between St. Paul Avenue and Jackson Avenue, and 4207 ft. of the same on curves leading from Main Street. This is a double-track line in the most congested district on the system, and a section over which all cars pass. The supporting steel poles

Phono-Electric

—in the Congested District and on the Curves—Because it Wears

It gives consistently faithful service and can be relied upon to stand the strain where traffic is heaviest.

Where trolley wire is subjected to eccentric wear or where permanently good alignment is necessary—curves for instance—that's where you need Phono-Electric Trolley Wire most.

Follow the example of the Memphis (Tenn.) Street Railway. Reduce maintenance costs NOW.

Bridgeport Brass Company
Bridgeport Connecticut

2141

Your Money's Worth of Light With Imperial Crystal Ray

Every available ray of light is put to work when Imperial Crystal Ray Headlights are on your cars.

Crystal Ray reflectors are clear glass mirrors, of true parabolic shape, ground and polished on both sides. All the light of the lamp is gathered into a clean sharp brilliant beam shooting far down the track.

There are Imperials—Incandescent, Luminous Arc, Carbon Arc—for every service from the white way district to your private right of way.

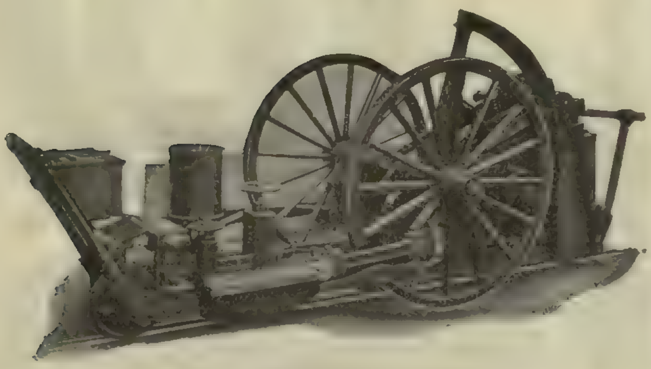
The Ohio Brass Company

MANSFIELD, OHIO

Manufacturers: Car Equipment, Trolley Materials, Rail Bonds, Hi-Tension Insulators, Third Rail Insulators

Exclusive Sales Agents in the United States for Crouse-Hinds Imperial Headlights

TRACK GRINDERS for Every Need



Reciprocating Track Grinder

WITH the Reciprocating Track Grinder the best results can be obtained with the removal from the rail head of a minimum of metal. It is especially adopted to grinding out corrugations and slightly cupped and new joints. With this grinder it is impossible for the grinding element to fall into a low spot. The consistent use of this grinder has saved thousands of dollars for many electric railways according to their own statements.

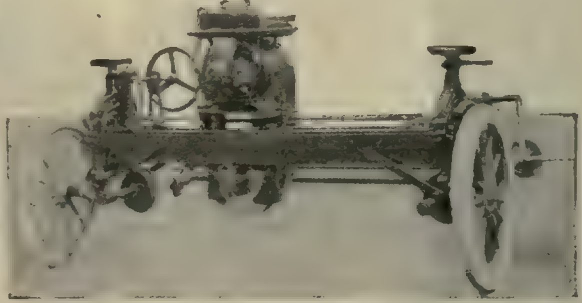
Atlas Rail Grinder

The Atlas Rail Grinder can be used to best advantages for getting into the grooves of girder rails, frogs, and switches and for removing surplus metal used to fill up low joints. The Universal Rotary Track Grinder which has many important advantages is slightly more expensive than the Atlas. It has a grinding wheel that may be tilted to meet any angle of the rail head, out board bearings on grinding wheel and other important features.

Tell us your track troubles

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.



Universal Rotary Track Grinder

Exclusive Agents:

ATLAS RAILWAY SUPPLY CO.,
Chicago, Ill.

ELECTRICAL ENGINEERING & MANUFACTURING CO.,
Pittsburgh, Pa.

Exclusive Agents:

CHAS. N. WOOD CO.,
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc.,
77A Queen Victoria St., E. C.
London, England.

63% for Bearing and 37% for Reinforcement

IN Steel Twin Ties the economical distribution of Steel under the work a tie is called on to do takes these percentages.

The larger proportion of the Steel goes into the Three-Foot by Thirteen-Inch Bearing Plates, which are Five-sixteenths Inch thick. Flanged sides provide for stresses in the plates and in combination with the Three-Foot-Long Bearing utilize all the Steel in them.

The smaller, but equally important, proportion goes into the Three-Inch Channels, which weigh Four Pounds to the foot.

They space the rail so accurately that no gauge is needed in laying Steel Twin Ties.

They also reinforce the track foundation at Three-Foot Intervals.

This efficient distribution of Steel is the fundamental principle of permanent, proved construction at less first cost than wood tie probabilities.

The International Steel Tie Company
Manufacturers of Steel Twin Ties and Crossing Foundations
16702 Waterloo Road CLEVELAND, O.

Steel Twin Tie Track

Indianapolis Welders

Indianapolis Welders have been largely responsible for the saving of $7000 a year, on one property which has had five in use for a period of more than four years.

For a three year period, after allowing for interest and depreciation, the figures are as follows:

Three years' charges (new rail)	**$25,245**
Three years' maintenance (old rail)	**3,540**
Three years' saving (old rail)	**$21,705**
Annual saving average (old rail)	**$7,235**

The success of the Indianapolis Electric Welder and of Indianapolis Apex joints is confirmed by their use on more than 90 per cent of the largest electric railways in this country and have won for this equipment the well deserved name of being

"The Greatest Aid of the Way Engineer."

Write for details. Get our Book on Track Disease

Indianapolis Switch & Frog Co.

Springfield, Ohio

KEYSTONE STEEL GEAR CASES

"Riveted for Strength—Welded to Hold the Rivets"

Made in standard forms for practically all modern types of railway motors.

By experience it has been found that a rivet is strong in one direction and a spot weld in exactly the opposite — against slipping.

To secure the strongest possible construction Keystone cases are riveted and welded. Soft, open-hearth, deep-drawing sheet steel of extra quality is used in the construction of these cases and breakage or tearing out of the sides is unknown.

Brackets are either steel or malleable iron castings or steel forgings and the manufacturing processes and design of these cases insure maximum strength and service.

There is a lot more about them—write for data sheet.

ELECTRIC SERVICE SUPPLIES CO.

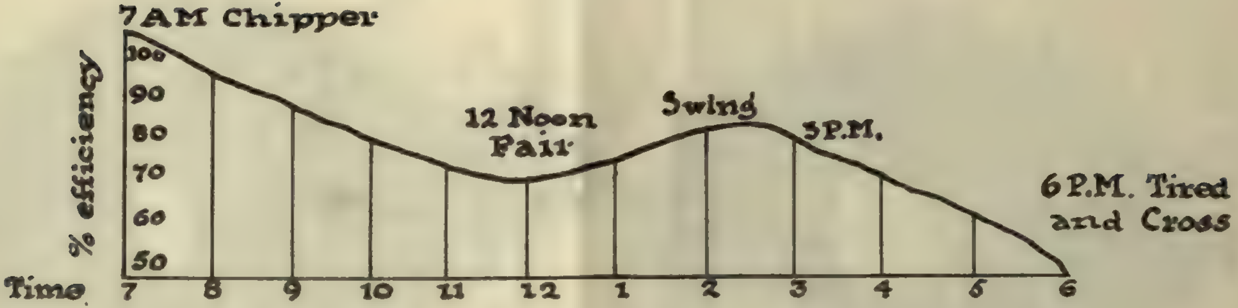
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church Street

CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto



What's the Answer?

Standardize! *Pneumatize!*

THIS little graph, as the highbrows would call it, tells the tale of a conductor on a non-pneumatized car.

He came to work at 7 a. m., feeling just great.

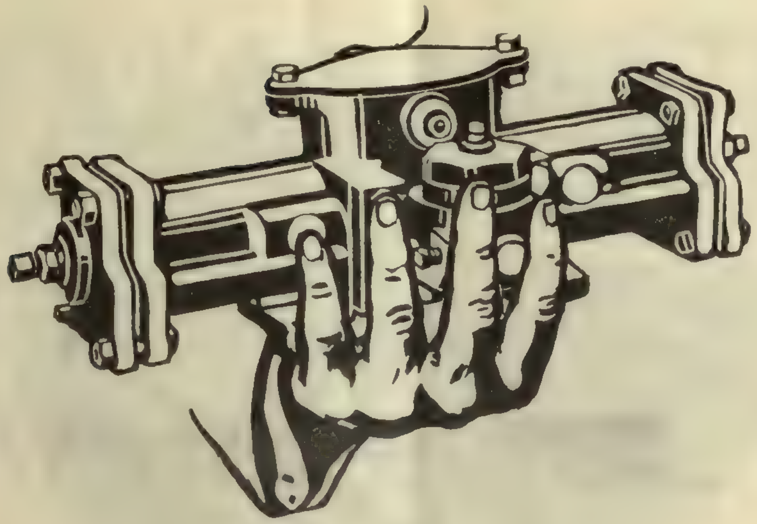
By 12 noon he had sagged considerably.

Came back somewhat better at 3 p. m. after his swing.

Then down and down went his snap and ginger until the arrival of the *busiest* hour in the day found him at his *worst,* both in strength and temper.

National Pneumatic Company, Inc.

50 Church Street, New York Edison Bldg., Chicago
Works: Rahway, N. J.



Standardize! Pneumatize!

CAUSE: Hand operation of doors and steps; hand pulling of signal cords; arguments with the motorman to get a move on; distraction from trying to do all these things and collect fares at the same time.

CURE: National Pneumatic Door and Step Control and Mechanisms, Motorman's Signal Lights, Safety Interlocking Door Control.

REASON: National Pneumatic equipment never tires or gets flustered or loses its temper.

National Pneumatic Company, Inc.

50 Church Street, New York **Edison Bldg., Chicago**
Works: Rahway, N. J.

The ERICO

Portable Railbonding Apparatus

For pick up work—a few bonds to install here and there — put an Erico on the job. It's the speediest and most economical method of handling this class of work on the market today.

Two men follow after the section gang with a light outfit that can clear at a moment's notice and pick up the gaps in the return circuit.

And for straightaway bonding—100 bonds per day are readily installed.

Erico Bonding Apparatus not only assures good work—*it thoroughly discourages bad work.*

Write for complete data and a copy of our illustrated catalog.

THE ELECTRIC RAILWAY IMPROVEMENT CO.
Cleveland, Ohio

ANACONDA COPPER WIRE

The capacity of the Anaconda Rolling Mills at Great Falls is never affected by inability to secure an ample supply of raw material.

The Anaconda Copper Mines furnish an unending stream of ore to the Mills. Output thus keeps pace with demand. Delays in delivery seldom if ever occur.

Users of copper wire have learned to rely on the name Anaconda, not only as a mark of highest quality but as a guarantee of "on time" shipments.

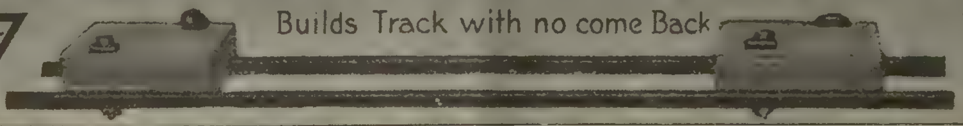
"From Ore to Finished Product"

Anaconda Copper Mining Company
Rolling Mills Department
Mills—Great Falls, Montana
General Office: 111 W. Washington St.
Chicago.

The RESILIENT RAILWAY TIE

Builds Track with no come Back

DMT Co



In the construction of new road-bed, an important factor to be considered is

Resiliency

A resilient road-bed is not only less noisy and more easy riding, but lessens wear and tear on equipment.

Dayton mechanical ties afford this resiliency so important in modern track construction. A cushion of asphalt is the shock absorbing medium. Result—Resiliency.

Build your track with no comeback.

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

ACKLEY BRAKES
Found The World Over

One thing
that never stalls

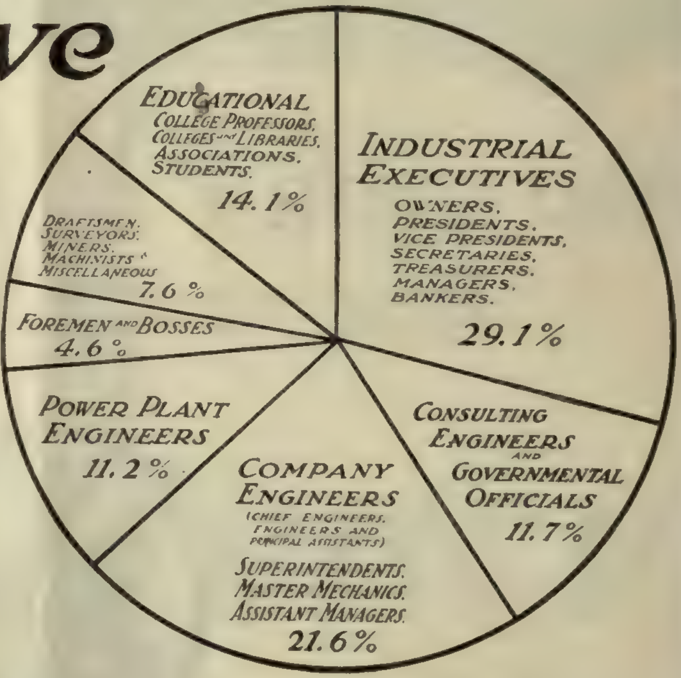
An Ackley Brake

ACKLEY NO-STAFF TRADE MARK BRAKE

ACKLEY BRAKE & SUPPLY CORPORATION
G.S. ACKLEY & COMPANY. REPRESENTATIVES
50 Church Street, New York, U.S.A.
Agencies throughout the World
Cable address "Acklebrake"

ACKLEY TRADE 2 E MARK BRAKE
THE ACKLEY COMPANIES U.S.A.

One out of Three is an Executive



These figures are obtained from the classification of the combined circulations of American Machinist, Coal Age, Chemical and Metallurgical Engineering, Engineering News-Record, Engineering & Mining Journal, Electrical World, Electric Railway Journal and Power.

Practically one out of every three readers of the McGRAW-HILL weeklies is an

Owner
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Vice-President
Secretary
Treasurer
Manager or
Banker

It is important for your advertising to reach the superintendents, engineers, master mechanics, foremen, bosses, etc.,—the technical men. Goods are bought to meet their specifications, new machines or materials must have their O. K.

Through McGRAW-HILL publications you directly reach these men.

But bear in mind that McGRAW-HILL publications not only reach the men who represent and serve the buying power, but men who actually *are* the buying power. In many cases they reach the owner of the company. They reach the administrative officers. They reach the financial men behind the company. They reach the chief executives—the manager and his immediate aids.

Twenty-nine and one-tenth per cent. of the circulation of the McGraw-Hill weeklies are men of this executive, administrative and financial group.

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Coal Age
Electrical World
American Machinist
Journal of Electricity
Ingenieria Internacional
Electrical Merchandising
Electric Railway Journal
Engineering News-Record
Engineering and Mining Journal
Chemical and Metallurgical Engineering

McGraw-Hill Company, Inc.
Tenth Avenue at 36th Street
New York

The 11 McGraw-Hill Publications

CHAPTER NINETEEN

THE ALL-*BUT* PERFECT STATE

A Commission Report of the Better Sort

This is a broad world—geographically.

We pay good money to have an analysis made of traffic and operating conditions—we look at it and file it—and the boys who made up the report are the only ones to benefit.

In the All-But Perfect State things will be vastly different—must be, to deserve the name.

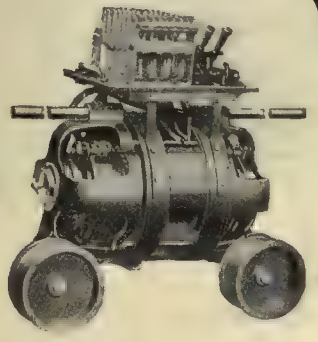
There when a report is asked for it will be the same as asking a doctor for an analysis. His real work doesn't come in until he prescribes something to cure the trouble—administers the dose on his own responsibility —and sticks to the job until the patient is cured—then gets his fee based on the ability of the patient to pay.

For instance if someone in the maintenance of way department felt that something was wrong with the return circuit—an investigation and report would be asked for and received with the notation "Bonding in bad condition. New bonding will solve the problem. Best way to do it is with Continuous Bonds—*but put on with the Dynamotor.*"

The word "Bonding" is an almost meaningless word unless followed with the above italicized sentence.

That's what puts the sound of sincerity into a report.

It leaves nothing to imagination or experimentation.



READING NUMBER NINETEEN

Q. Explain just why the Dynamotor gives a better method of applying bonds than any other known way.

A. It can't be done in a sentence. There are so many superior and economy-producing features about the Dynamotor that we've put it in convenient printed form for you and you don't have to be invited to send for it.

Rail Welding and Bonding Company

Formerly The Lincoln Bonding Co.

Cleveland, Ohio.

Don't keep men waiting for Hot Rivets

It takes 20 *to* 30 *minutes* after starting the fire to produce hot rivets with a fuel-burning heater. Unless furnace is started ahead of time the men are kept waiting. When work is indoors more time is lost—waiting for smoke and fumes to clear out. Figure how much time *your* men lose in this way. (We estimate 1-16 to 1-12 of each shift). Then you will realize *one* of the savings effected by

BERWICK ELECTRIC RIVET HEATER

Hot Rivets in 20 to 30 seconds

—without smoke, gas or intense heat

The Berwick is always at instant command—whether for few rivets only in short repair jobs or a steady stream of 2 to 10 per minute (depending on size of rivets and type of Heater). Power used only when hot rivets are needed.

Costs less to run than fuel-burning heaters. Less than 20 kilowatt-hours per hundred pounds of rivets heated. Reduces burning and scaling to less than ⅓ of 1 per cent. Every rivet in plain view while being heated. No mass of fused and matted rivets at end of day's work.

Can be placed close to work without discomfort to workmen. Easily portable. No dirt or drippings.

Send for catalogue. State rivet requirements and alternating current conditions.

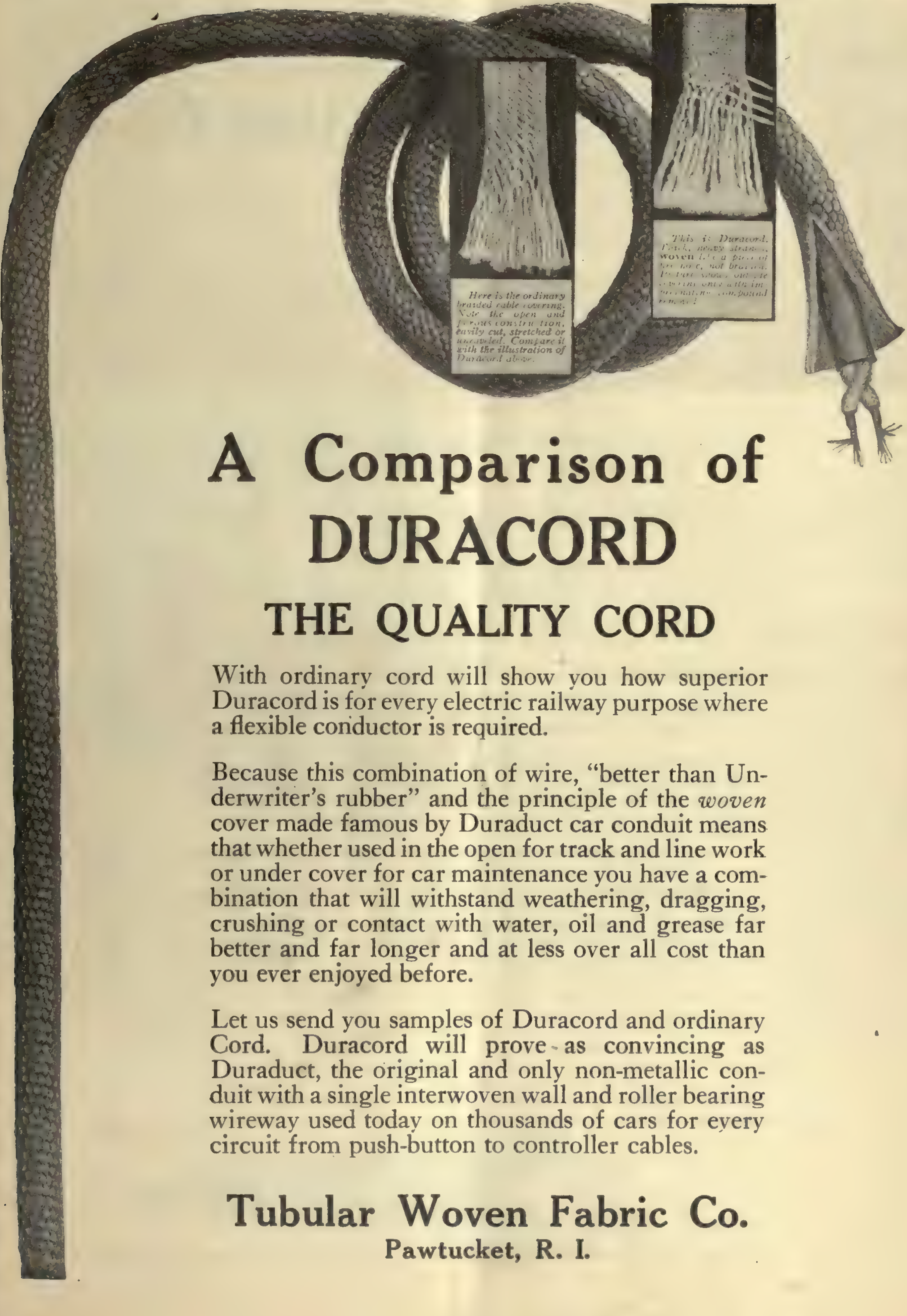
No. 4 three-electrode Berwick Heater. For 1 in. to 1 1-2 in. rivets, up to 10 in. long. Eight other standard types and sizes for various requirements

American Car & Foundry Company

165 Broadway, New York

Railway coach, dining and sleeping cars; express, baggage and mail cars; electric railway cars; freight cars, including bunks, gondola, hopper dumping and tank types and cabooses; special purpose cars for carrying cane live stock, etc.; industrial, mine and logging cars; car parts, including trucks, coupler pins, and links, and chilled cast iron wheels; electric rivet heaters; bar iron steel; bolts, nuts, and rivets; iron-body gate valves; flanged pipe.

10



This is Duracord. Thick, heavy strands, woven like a piece of fire hose, not braided. [illegible] with impregnating compound removed!

Here is the ordinary braided cable covering. Note the open and porous construction, easily cut, stretched or unravelled. Compare it with the illustration of Duracord above.

A Comparison of DURACORD

THE QUALITY CORD

With ordinary cord will show you how superior Duracord is for every electric railway purpose where a flexible conductor is required.

Because this combination of wire, "better than Underwriter's rubber" and the principle of the *woven* cover made famous by Duraduct car conduit means that whether used in the open for track and line work or under cover for car maintenance you have a combination that will withstand weathering, dragging, crushing or contact with water, oil and grease far better and far longer and at less over all cost than you ever enjoyed before.

Let us send you samples of Duracord and ordinary Cord. Duracord will prove as convincing as Duraduct, the original and only non-metallic conduit with a single interwoven wall and roller bearing wireway used today on thousands of cars for every circuit from push-button to controller cables.

Tubular Woven Fabric Co.
Pawtucket, R. I.

Collier Service

The Touchstone of the Industry

There are two media of information that make Collier Service the touchstone of the electric railway industry.

The human medium is furnished by the hundreds of Collier Service men throughout the land engaged in every activity from contract closing to car carding.

The mechanical medium is furnished by our perpetual record of facilities of the hundreds of Collier Service Railways.

And both media tell us that electric railway transportation is a live business, a growing business and a business worthy the continuance of our best efforts.

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The Fabrikoid Process adds beauty and long life to fabrics; some heavy and rugged, others dainty as linen—all pliable, scuff-proof, stain-proof and water-proof

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Canvas Roof Paint
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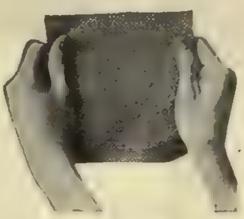
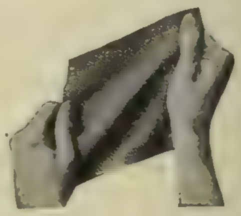
This Is the Stiffest Test for Any Canvas Preserver—TRY IT!



After preparing the canvas as directed below, hold it this way when beginning the test. Note how completely the surface is protected—yet the canvas is springy and totally free from stiffness.



Watch the paint on the fibres as you bend and twist the canvas. Absolutely no cracking or peeling! When you release the canvas, see how the fibres snap back to their original position.

Take an 8-inch square of new canvas and paint it with SURPACO Canvas Preserver—give it a free, heavy coat so that every fibre will be thoroughly saturated.

After the Preserver dries, cover with two coats of SURPACO Canvas Roof Paint, allowing sufficient time for thorough drying between coats. Take particular care, though, not to apply too much paint in these second and third coats—the idea is to work the paint thoroughly into the fibre and rub it out with the brush as thin as possible over the surface. This keeps the canvas pliable and elastic.

Now for the test. When the paint has dried thoroughly, grasp the canvas firmly at the sides with both hands (see illustration above). Then STRETCH IT, TWIST IT, BEND IT, JERK IT in any way you wish. See how the fibres always spring back to their first position. Note the pliability of the entire piece of canvas, how it stands up under distortion and strain and always comes back to its original shape. Note that the paint surface is always unbroken.

* * *

After you have made this test yourself you will know why SURPACO Canvas Preserver and Roof Paint actually preserve the fibre without stiffening the canvas; why they so successfully withstand the constant twisting, heavy vibration and exposure to which every car roof is subjected.

And, you will also know why it is best always to specify SURPACO for all of your canvas roofs.

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Four technical men in Syracuse

And what the Alexander Hamilton Institute's training did for their positions and incomes

RECENTLY a great engineering school made an analysis of its graduates. The survey disclosed this surprising fact:

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Number one was in the engineering department of a large automobile manufacturing plant when he enrolled. He is now district sales manager for his company in Kansas City.

Number two was chief engineer of an interurban railway and is now general manager of a suburban railway system in Syracuse.

Number three, a salesman for one of the large builders of electrical machinery, became manager of a lighting company at an increased salary.

Number four, chief engineer of a rapid transit company, is now general manager of a new electric railway system in Maryland.

All four of them had attained some success before their enrollment — most men who enroll with the Institute are mature and have already shown ability — but they might have spent their whole lives in moderately-paid departmental positions.

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THE Alexander Hamilton Institute deals not in arguments but in facts. It rests solidly on three great foundations: First, the men behind it—the leaders of business education in America; second, the thousands of men whose careers are proof of the value of its training; and third, the Advisory Council which consists of: John Hays Hammond, the eminent engineer; Frank A. Vanderlip, the financier; General Coleman duPont, the well-known business executive; Jeremiah W. Jenks, the statistician and economist; and Joseph French Johnson, Dean of the New York University School of Commerce.

You are paying for this training whether you accept it or not

BUSINESS training costs a little in money and in time, but what a price those men pay who never get that training!

They pay in years of routine progress when the progress might be rapid and sure; they pay in opportunities that pass them by because they have not the knowledge and self-confidence to reach out and make those opportunities their own.

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JUST what the Institute's Modern Business Course and Service is; just what it has done for other men in the matter of position and of income — these facts are printed in "Forging Ahead in Business." It is a book worth adding to your business library, and for every thoughtful man there is a copy without obligation. Send for your copy today.

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U. S. ELECTRIC SIGNALS are always on the job.

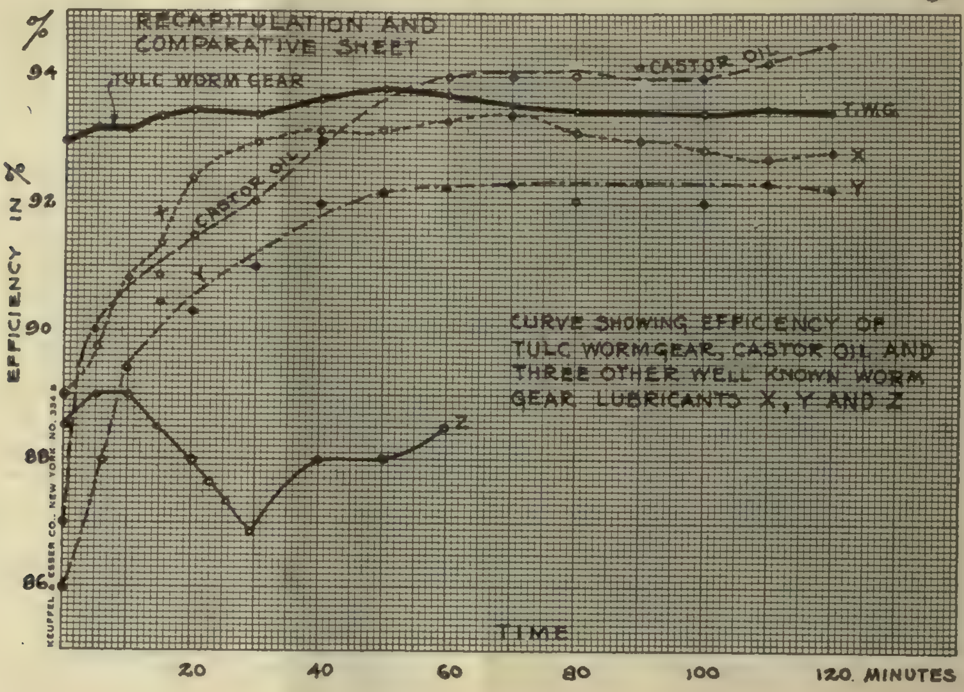
Night and day they tell truthfully what is going on in the block. They give the motorman time to bring his car to a stop.

Automatic in action, they never misregister or fail to act — they really protect. The success of U. S. Signals is the best recommendation that we can give. They have qualified as guardians of safety. Send for bulletin and learn *why*.

United States
Electric Signal Co.
West Newton, Mass.

—how individual lubricating service reduces lubricating costs-----------------------------

This Chart Tells the Story



The above is a recapitulation of five seperate runs

Data:

Room temperature 90 degrees F.
Time of run in each case, 2 hours.
Readings taken every 10 minutes.
Machine used had Hindley Worm Drive size and speed and conditions to compare to actual commercial use.

Write for Booklet "Results"

THE UNIVERSAL LUBRICATING CO.

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Factory: Sweeney Ave. **Office: Schofield Bldg.**

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Maximum Service— Minimum Maintenance Costs

Wheel removal costs and costs of turning are always supplemented by the following labor charges. (1) Cost of reapplying wheels to equipment, (2) cost of renewing or reclaiming journal brasses, (3) cost of replacing bolts and nuts every time wheels are changed, (4) cost of shimming cars to maintain coupler heights. The one-wear feature of Davis Steel Wheels eliminates all of these labor charges.

American Steel Foundries

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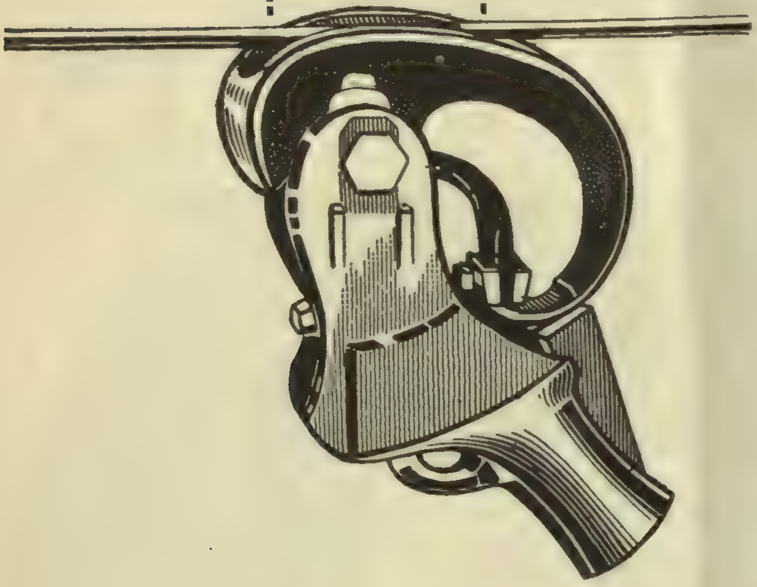

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Miller Trolley Shoe operation proves that the greater the contact surface more power is delivered to the motors, giving greater capacity for overloads.

THE MILLER TROLLEY SHOE

has a contact on the wire of 3 inches. This contact is permanent. The Shoe follows each little unevenness in the wire. It does not jump and eliminates all sparking.

Miller Trolley Shoes have solved many problems that were the outcome of low voltage.

We stand ready at all times to show you on your own lines just what an advantage can be obtained by equipping your cars with the Miller Trolley Shoe.

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Safeties are just what the word implies; they are safe in operation and especially from the financial investment angle.

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"Bound Brook" Oil-less Trolley Wheel Bushings are the best because they have a self contained lubricant that never gives out. Regardless of speed, regardless of attention, they are always lubricated.

"Bound Brook" Trolley Wheel Bushings are now used by two-thirds of America's electric railway systems

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"Specialists in the manufacture of Oil-less Bushings for more than a third of a century."

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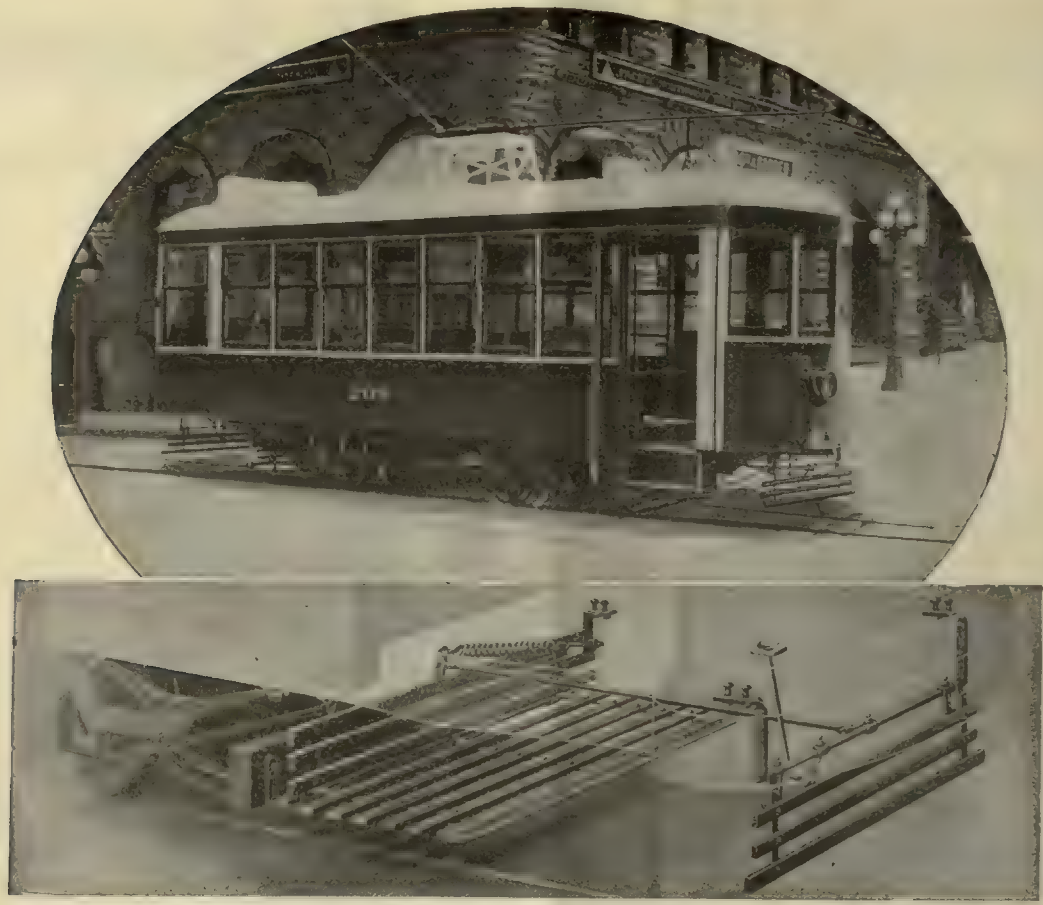

You Can't Prevent

the passing pedestrian from falling in front of your cars; accidents of that nature have always happened—they always will happen. What you can prevent is the possibility of a serious accident by equipping your cars with

H-B Life Guards

Their operation is positive and instantaneous. H-B life guards have completed the principle of making the safety car safe. They form as necessary a part of safety car equipment as the air brake.

Let us send you complete details as to their operation.

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The history of *Galena Service*, as represented by the master organization of mechanical experts maintained by this company, is one of exceptional accomplishment in effecting efficient and economical operation. Through the personal and practical co-operation of these lubrication specialists, thousands of dollars are saved annually to the traction lines of America, in time, reduction of repair bills and extra mileage attained through the use of the right oil in the right place.

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One of the plants where G-E Armature Coils are made

Order Your G-E Armature Coils Now For Your Next Winter's Needs

Particularly in winter, is it advisable to have on hand plenty of repair parts for car equipment.

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G-E Armature Coils for G-E Motors insure an absolute fit, saving time and injury to the coil in installing and later shrinkage and vibration in service. G-E Armature Coils are steam moulded, insuring permanent fit.

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 56 New York, Saturday, September 18, 1920 *Number* 12

The Amalgamated and the B. R. T.

THE events of the past week have justified the position taken early in the Brooklyn strike by Receiver Garrison, acting under instructions of the Court, to have no further dealings with the Amalgamated Association. Even the effort of Governor Smith to bring about a conference over the situation between Judge Mayer and the head of the American Federation of Labor was unsuccessful. Evidently the time of the Amalgamated on the Brooklyn system has passed. It may be that the situation got out of the control of its highest officials during the early part of the contest. In that case, as Mr. Garrison points out and as was done in the Pittsburgh strike, the men should have been ordered back to work. As it is now, the officers responsible for the operation of the Brooklyn Rapid Transit system will have the opportunity of comparing the relative efficiency and discipline of its force under Amalgamated control, as during the past twenty months, and outside that control, as in the future.

Motor Truck Competition Is Not on a Sound Basis

THE motor truck manufacturers and rubber tire producers are engaged in a very broad and vigorous campaign to foster the "ship-by-truck" movement for evident selfish reasons. They are making real headway despite the fact that shipping by road is bound to be more expensive than by rail, except for the short-haul business.

The phenomenal growth of the ship-by-truck movement, in our opinion, has been due primarily to the inability of the steam railroads to handle the business offered, either at all or only with great delay. The cost of transportation has been of minor importance to the shipper, whose principal problem was to send to the consumer, or that of the consumer to get from the manufacturer, the equipment, merchandise, materials or supplies that were essential to the continuity of a business enterprise. In this circumstance an abnormally high transportation charge was of insignificant consequence compared to the need for the thing or material wanted, and wanted quickly. And since with war conditions there was no end of instances of this kind the truck transportation business flourished, and as war conditions or worse have continued since the signing of the armistice the trucking business has continued to grow. The companies so engaged have made money, but they have made it at fairly high rates and largely at the expense of the taxpayers who have built the roads.

In June of this year the writer drove from New York City to Chicago over the Lincoln Highway. Undoubtedly this highway has had more maintenance and improvement work done upon it in the last three years than any other series of roads in the country, by far. Yet, despite the enormous expenditures of money used in this way, decidedly the greater part of that famous highway between New York and Chicago is not only not good for driving but is decidedly bad. The only really good portions are those stretches that have been built within a year—or at least are practically new. Outside of these stretches of new construction the roads vary from fair, with an occasional hole, to roads with the surface all gone and the stone foundation so full of sharp holes that it is passable only at the slowest speed at which a car can be driven. For as much as 60 miles in a stretch road is encountered on which the surface is all gone, and the tourist—as well as the local farmer—is compelled to travel at a snail's pace and suffer great discomfort, not to mention the strain and wear on a car or farm motor truck. Then there is mile after mile where the tourists (and all vehicles) have taken refuge from the once improved road in a new trail in the sod along the roadside. Even road that is comparatively good is studded here and there with a dangerous hole or break in the paving—the beginning of what soon becomes a complete disintegration.

This is a rough picture of what heavy trucking is doing for our principal national highway, and we are informed by highway experts that it is typical of the deterioration of the improved roads everywhere, but particularly in the country surrounding all of the larger cities. Concrete, stone and macadam, brick and gravel roads, all seem to suffer a similarly rapid disintegration, for the better the road the heavier the traffic. Seemingly the only roads that are standing up are those from which heavy trucking is barred, and the number of such restricted roads is rapidly increasing.

This Form of Competition Should Grow Less

IT SEEMS to us that these things point unmistakably to the following conclusions:

The abnormally congested condition for freight on the steam roads, which has contributed so greatly to the success of motor truck companies in the past, is rapidly passing, so that the expense of transportation will be a more and more important consideration in the future when a choice of carrier is made. The astounding disintegration of the good roads, due to the trucking, is bound to react against the ship-by-truck movement. It is only a matter of time until the farmers and motorists and taxpayers generally will become aroused to the destruction of the roads that is resulting from the trucks and will then either insist upon truck transportation companies paying a justly heavy penalty for the privilege of using the roads or will rule them off the roads altogether. When truck companies are forced to pay their fair share of the original construction cost and maintenance of the highways they use their operating costs will be so high as to react seriously against their ability to secure business, except short haul. And this condition is surely coming.

The public is slow to appreciate a situation of this kind, but there are already frequent evidences of an aroused opinion against allowing the truck companies the free use of the highways. Certainly the people are not going to tolerate an endlessly increasing tax rate made necessary in large part by increasing road maintenance costs. And if the roads are not maintained because of limited funds truck companies are going to suffer materially and their operating costs and rates increase correspondingly, even though they are not made to share directly in road maintenance, for bad roads mean very high truck-maintenance costs.

Mindful of these things, we incline to the belief that the electric railways have not a great deal to fear in the future from motor truck competition. With a return to normal business conditions shipments of all kinds will find their way back to transportation by rail, and at rates that the truck companies cannot possibly meet. Normal times will mean a return of normal competition, and that is what the electric railways can welcome, for in neither service nor cost can the gasoline-propelled highway motor truck compete with the electrically propelled rail car—certainly not if the truck is compelled to pay a proper portion of the roadway expense, and probably not even without this expense.

We think the motor truck companies know full well that they must sooner or later stand a share of the highway expense, but they are getting business while the getting is good. If they can jump in now, free from right-of-way expense, and make a large profit they can afford to conduct an insecure business, retiring therefrom when the public is aroused to action. This would seem to point to the logical interest of the electric railways, as very large taxpayers, in the enlightenment of the public on the use of the rails to save the highways.

A Tremendous Undertaking Well Done

NO SMALL task confronted the Interborough Rapid Transit Company in the Brooklyn Rapid Transit strike. The company has long had short extensions in operation between Manhattan and Brooklyn, but just before the strike the Nostrand Avenue and the Eastern Parkway extensions of the subway were opened in that borough. It was to these lines that the principal task fell of lending transportation succor to the residents of the East New York and Flatbush sections of the "city of churches." The lines were not thoroughly tuned up when the call was made upon them for service in the strike, but so thoroughly had the Interborough done its work of schooling its men and preparing for the opening that the company was able to handle approximately 400,000 additional Brooklyn passengers a day on all of its lines. This was a physical task of tremendous proportions.

Motor bus lines and vehicles of all descriptions fed their hordes into the sixteen Interborough stations in Brooklyn, but the company picked the passengers up and landed them in Manhattan via two tubes under the East River with a minimum of discomfort as far as its part of the work was concerned. Publicity played its part in the undertaking, for the company, previous to opening the lines, carefully placarded its stations with maps and distributed pamphlets giving all details as to trains. Great credit has been reflected upon the whole organization by the celerity with which the task was accomplished. The Interborough has good reason to be proud of its record. New Yorkers, however, seem to have accepted as a matter of course a transportation feat at which men acquainted with problems of traffic handling all marvel.

That Section Membership Trophy Still Reposes at Providence

THE company section movement has not been very active during the past three years or so, which is not to be wondered at in view of the circumstances under which electric railways have been operating. The clouds are lifting now, however, and some live spirits in the industry ought to be starting new company sections of the American Electric Railway Association. With a view to stimulating interest in this worthy field of association activities, the ELECTRIC RAILWAY JOURNAL, in the spring of 1918, donated to the association a silver cup to be held by the section organized with the largest membership. This was in due course awarded to the Rhode Island Company section, which still retains it. Without desiring to deprive the section at Providence of the "rights, privileges and honors thereunto appertaining," the JOURNAL would suggest that the trophy fails of its main purpose unless it passes occasionally from hand to hand. It is necessary only to start a section with 217 members to secure possession of it.

A Live Line Not Necessarily a Deadly Line

SOME power companies have been testing and repairing high-voltage lines while "hot" and claim that such practice is cheaper, safer and quicker than the usual one of "killing" the line when work is to be done upon it. Shields, tools, insulators and methods have been developed to such an extent that many power companies now do all insulator replacement and testing, splicing and other line work on live lines. For example, the Consumers' Power Company in Michigan and the Georgia Railway & Power Company in Georgia have developed and successfully used methods for live work on their lines.

Both safety and service conditions indicate a trend toward other methods in line work than have been the practice. Accidents to employees occur to a great extent among linemen and electricians who have been educated in the "dead line" school. Sudden circuit interruptions, insulator and transformer breakdowns, rotary flashovers, fuse burnouts and other continuity-of-service factors in our ever-growing complexity of apparatus and circuits all tend to make for a quicker and better method for handling emergency and routine line and substation conditions.

Dead lines become live ones too frequently for safety in spite of extraordinary precautions; network circuits offer too many opportunities for energizing supposedly dead lines. Most accidents are due to the old story: "It was supposed to be a dead line." No man takes liberties with a live line, and perhaps there are many advantages in treating all lines as live lines. If we adopt the live-line method of operation only two factors enter into consideration, relative speed and availability of properly insulated apparatus and methods.

It is claimed that speed in repair and testing is much greater in live-line working, as no time delay occurs because of communication with substations or power stations in order to kill or energize lines and no special grounding apparatus is necessary. The line force can operate on the emergency repair immediately and need have no connection with any other division of the operating organization. All insulator tests can be made while lines are utilized for delivering energy. A remarkable fact is that the employees prefer live work. It means steady employment with better morale instead of late-at-night or off-load emergency and rush work. It permits routine rather than emergency line force conditions.

Probably the greatest asset to operating companies in live-line repair work is the fact that service interruptions are quickly repaired without disturbing the system routine. Costs of tools and the other items are immaterial under these conditions and only speed and safety are considered. We venture to predict a greatly increased amount of live-line work for the electrical industry and can see many advantages of live-line work on the high-voltage lines that will be used in connection with future trunk line electrification projects, particularly in the West.

Speeding Up Car Repairs

THE combination of high prices and lack of money has forced electric railways to defer the purchase of new rolling stock, and on many properties all of the available cars are needed continually. Naturally, considerable pressure is brought to bear upon the mechanical departments by officials to insure that necessary repairs are made as speedily as possible. Labor organizations have condemned the practice of working overtime, so the getting out of damaged cars and even those that are brought in for repairs on a prearranged schedule has proved a serious problem. The effect of this need is to place maintenance programs and practices on a higher plane than ever before. Railways are giving more attention to the arranging of repair schedules so as to fit in with the needs of the transportation department.

In the old days when duplicate equipment was used the open cars were repainted in winter and the closed cars in summer. Now with equipment in operation continually throughout the year the best schedule for the paint shop, the overhauling shop and other repair departments would be to have the cars pass through the shops at a uniform rate. But when the field of transportation is considered with a view to producing the most efficient system as a whole it is evident that there must be intimate co-operation between the operating and mechanical departments. The best arranged schedule of repairs from the transportation department standpoint would be one under which cars are withdrawn from service in greater numbers during off-peak periods of traffic. Thus, for example, if the transportation department finds that it needs all of the cars during December and January, repairs during these months should be limited to such as are absolutely necessary and should be carried out as speedily as possible.

The question in its broadest aspect then is to decide between low maintenance cost, which results from a uniform schedule of repairs with more equipment, as against a plan of eliminating certain work and classes of repairs during maximum periods of traffic in order to have a smaller investment in rolling stock.

To assist in this work the operating department can also do much. Careful operation decreases the number of damaged cars. Furthermore, cars should not be turned in for minor repairs by the transportation department as happens to suit its convenience, but they should be ordered in by the mechanical department at times when they can be handled speedily. It is only by exerting their best efforts in such directions as this that railways can give most satisfactory service to the public.

Automatic Substation Invades Cleveland

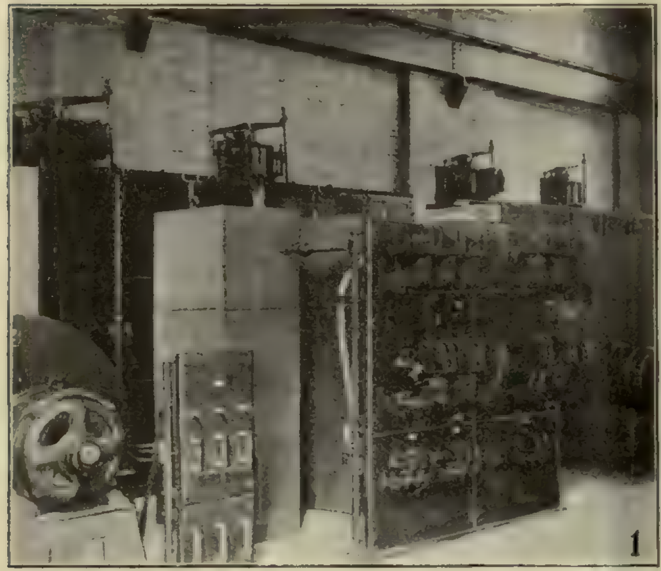
THE Cleveland (Ohio) Railway decided to try out the automatic control plan only after considerable deliberation. There was no question in the minds of its engineers as to the applicability of automatic control to interurban line operation and to many city conditions. Whether it would function adequately in Cleveland was another question. This question was considered several years ago, in fact as soon as the scheme was seen to have possibilities. If it had not been for the war Cleveland would have had at least one "automatic" much earlier, as it was the ardent desire of L. P. Crecelius, superintendent of power, to study the performance of a sample equipment under actual local conditions.

Now, when automatic equipments can be obtained with reasonable celerity, the railway company cannot wait to experiment, for Cleveland is growing so rapidly, with a corresponding demand for power to drive the cars, that additional substations had to be provided at once. And, fortunately, the reputation of the automatic substation is now so good that the decision was promptly reached to equip the next four "subs" at least, including the Cleveland Heights station just completed, with control apparatus of this type.

Practically all of the "automatics" now in operation are of the one-unit type. The notable exception is the Oakland substation of the Rhode Island Company, described in the issue of this paper for Dec. 14, 1918. To be sure, the Milwaukee Electric Railway & Light Company put in an automatic station with two rotaries as long ago as three years, but these were 600-volt machines, operated as a pair in series, and were essentially one unit as far as the control was concerned. The Heights substation in Cleveland contains a two-unit equipment and the two machines are arranged ingeniously to relay each other, keeping the individual rotary load factor as high as possible. This is the most difficult duty which can be imposed on the apparatus, but there is no inherent reason why it should not be reliably performed. The results here will be watched with particular interest because the Cleveland Railway has been very successful in keeping the rotary capacity adjusted to the "load line" in its manual substations. How the two methods of control compare in this respect will be considered later after operating records are available.

In an article printed elsewhere in this issue the appearance of the Heights substation is shown by means of drawings and pictures, and the essential operating principles are pointed out. A few minor changes in the control are still being made, so that the technical account of the layout will be deferred for a few weeks until the finishing touches have been applied. In the meantime the station is giving an excellent account of itself.

Cleveland Heights Two-Unit Automatic Substation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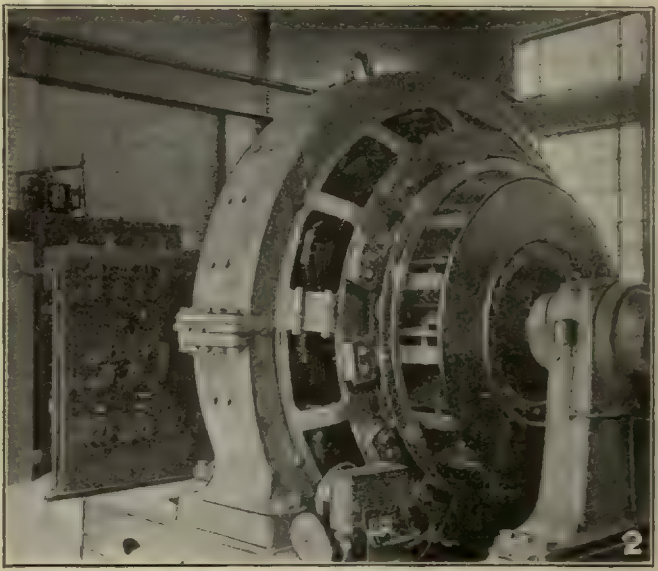
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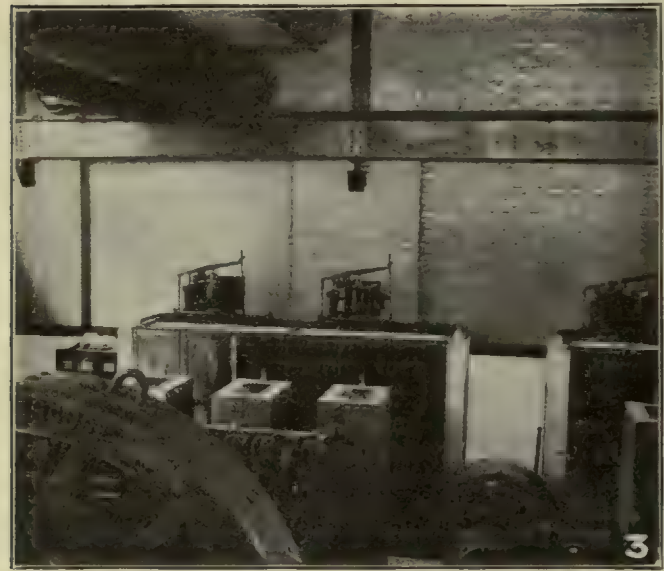
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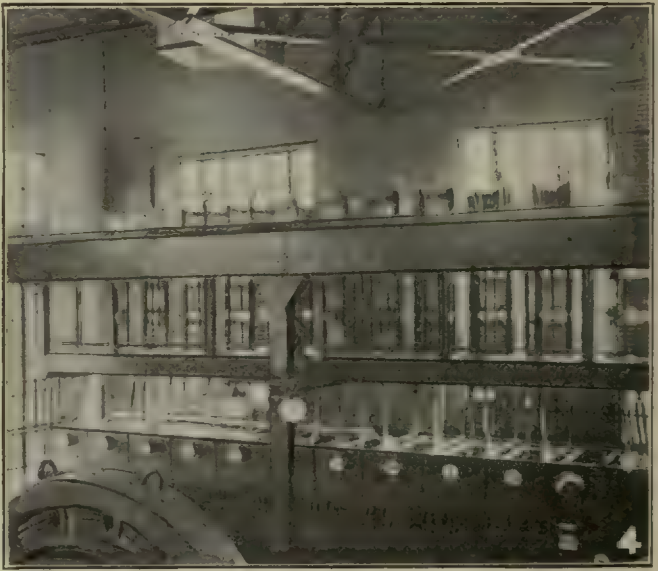
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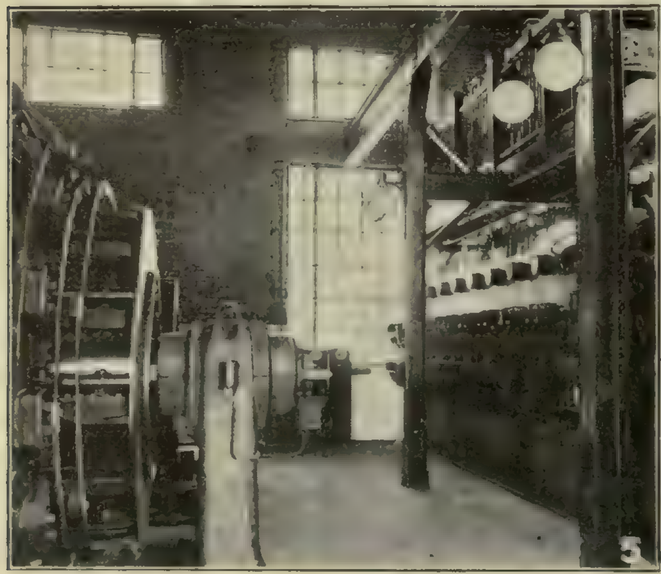
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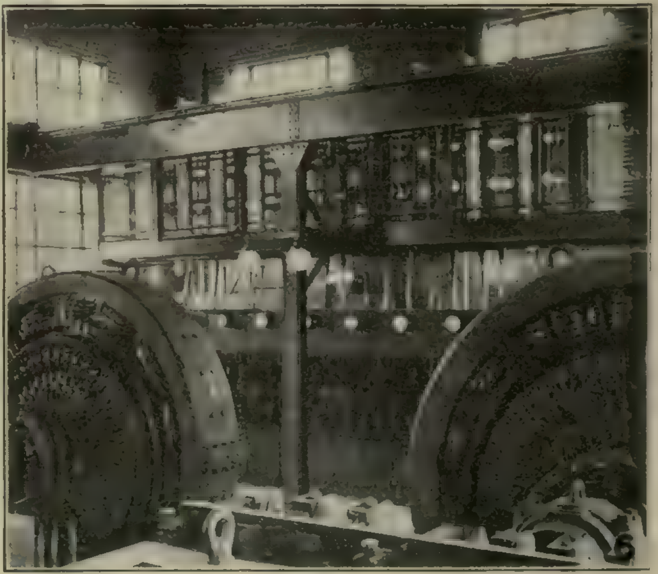
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1—Starting panels for rotary and blower motor.
2—One of the 1,500-kw. rotary converters.
3—Looking down from gallery over one rotary and its starting panel, transformers and oil switches.
4—General view of equipment in and under gallery.

5—Commutator-end bearing of rotary, switchboard and columns supporting one crane rail.
6—Alternating-current end of rotaries with resistor gallery in background, taken from top of alternating-current oil-switch compartments.

The Cleveland Railway Commissions Its First Automatic Substation

Cleveland Heights Section Now Supplied from Two-Unit Station Containing 1,500-Kw. Rotary Converters, Arranged to Adjust Capacity to Load Automatically

THE Cleveland (Ohio) Railway has just put into operation the first of several automatic substations to care for the rapidly growing demand for power from its system. This substation is of particular interest because it is the first of the Westinghouse two-unit substations. It is the largest automatic substation yet put into operation and it embodies a number of new operating details. In fact, there are several minor improvements still being installed, so that at this time it is possible only to give a preliminary statement of the details. A later article will take up the technical features, with an account of the exact sequence of operations. The accompanying illustrations are from recent photographs and drawings and show the station as it is today, complete as far as the general apparatus is concerned, but awaiting a few finishing touches inside and out.

FACADE OF SUBSTATION WITH CONDUIT TERMINAL AT LEFT IN FOREGROUND

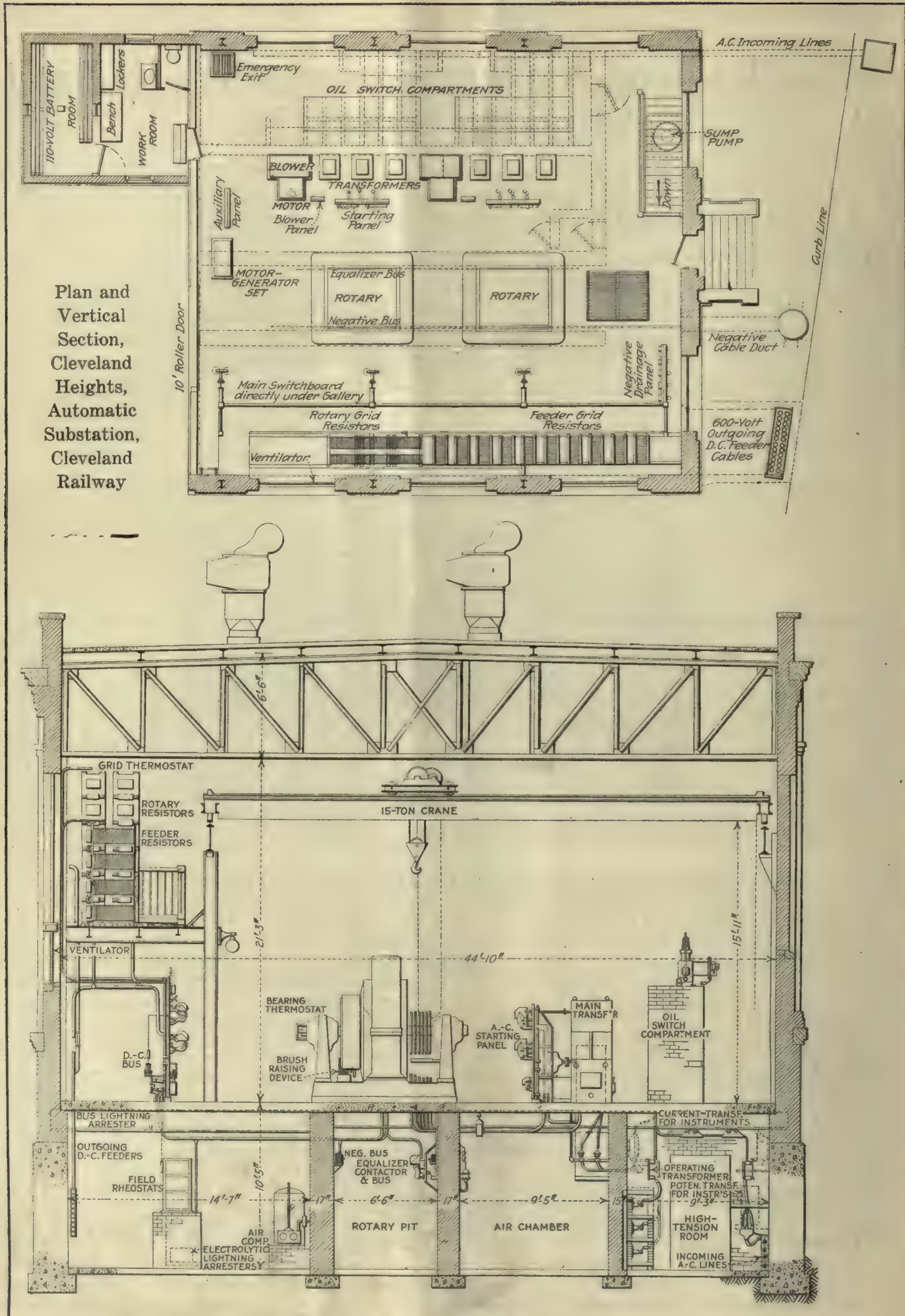
For about eight years the Cleveland Railway has been using power in increasing quantities from the Cleveland Electric Illuminating Company. The contract with the power company went into effect Nov. 15, 1912, at which time the railway had one substation in operation. A comprehensive program of expansion of substations and distribution systems has been under way in the meantime.

In an article in the issue of the ELECTRIC RAILWAY JOURNAL for April 5, 1913, page 618, the subject was covered in a rather complete fashion and the design and construction of the Windermere substation, the first one, were discussed and illustrated. In that article a map was given showing the substation layout plan then under way, four substations being indicated. These were: Windermere, with an immediate installation of four rotaries and an ultimate installation of five, all of 1,500-kw. capacity; Harvard Avenue, with three and five rotaries respectively; Coutant Avenue, with two and four, and West Twenty-fifth Street, with two 1,000-kw. rotaries at the start and four 1,000-kw. rotaries ultimately. In the article attention was directed particularly to the design of the 60-cycle rotary converters used in these substations, which embodied a number of features included for the purpose of minimizing danger of flashover, hunting, etc. The rotaries were built with liberal quantities of active iron and copper, and with very heavy armatures having great energy storage capacities and operating at high rotative speed. The rotaries are provided with squirrel-cage dampers, mounted in the main pole pieces, for use in starting and for preventing hunting. These rotary converters operated very satisfactorily.

The experience of the Cleveland Railway with this new type of rotary was covered in a paper read by L. P. Crecelius, superintendent of power of the railway, before the Cleveland Section of the American Institute of Electrical Engineers, on March 23, 1914. This was abstracted in the issue of the ELECTRIC RAILWAY JOURNAL for March 28, page 713. Mr. Crecelius' remarks and the resulting discussion showed conclusively that the 60-cycle rotary converter was an assured success and that the fear of unsatisfactory operation was not warranted as a deterrent in the use of machines of this type where there was good reason otherwise for using them.

These references to the early history of the Cleveland Railway substations are given in order to show how a logical foundation was laid for such future developments as that of the automatic substations, although at the time this particular innovation had existed in the minds of only a few pioneers.

The fifth substation in the series, and the immediate predecessor of the new automatic substation, was that located on Cedar Avenue at the point where a steam power plant had been previously located. This steam plant is shown on the map reproduced with the first article referred to. The Cedar Avenue substation was the largest of the series, containing eight 1,500-kw. rotaries. This brought the total substation equipment of the system up to twenty-three 1,500-kw. units and two 1,000-kw. units, a combined capacity of 36,500 kw. In addition there is the Viaduct power plant, 600-volt direct current, with a capacity of 42,500 kw. When the four automatic substations forming the present program are completed the substation capacity will have been



Plan and Vertical Section, Cleveland Heights, Automatic Substation, Cleveland Railway

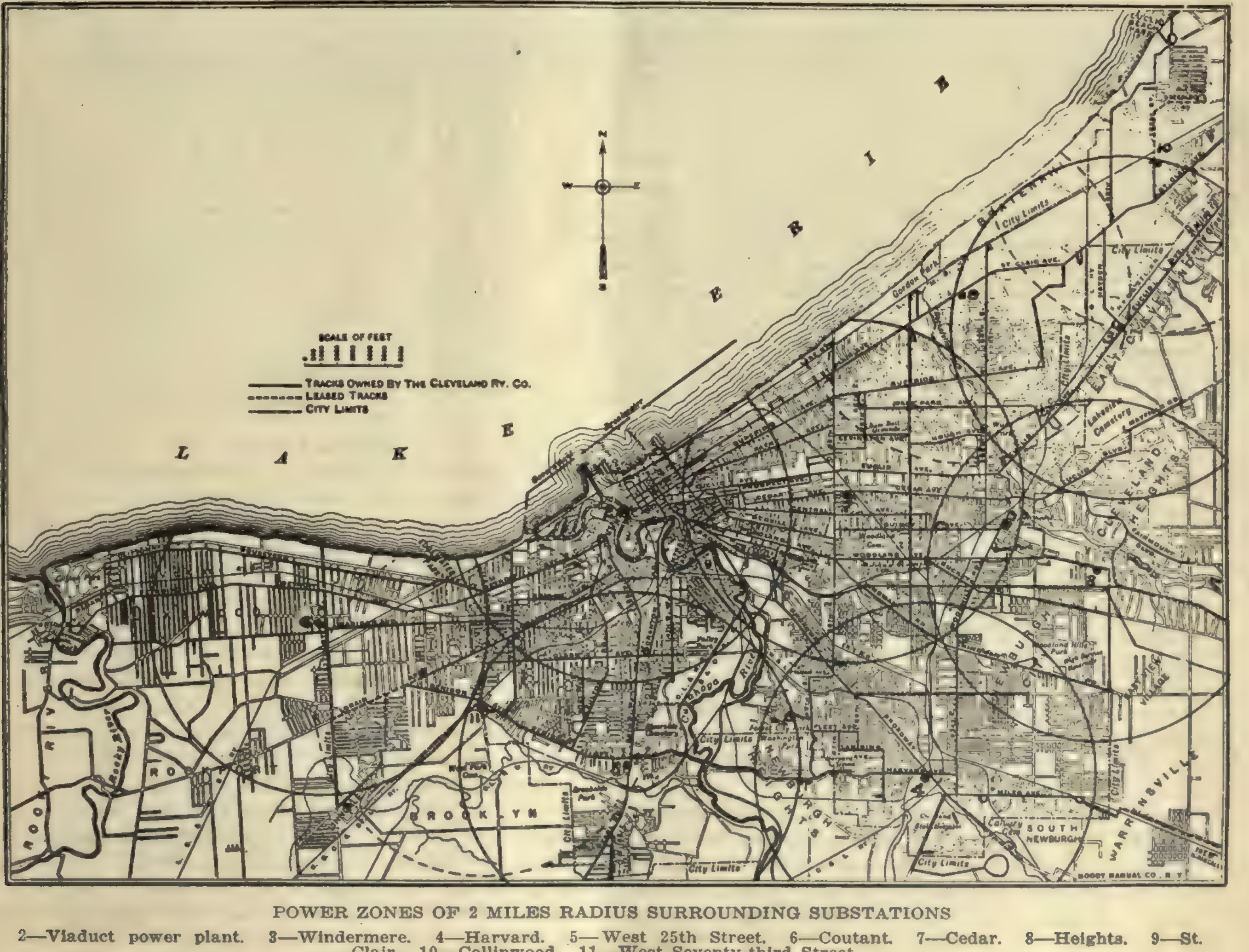
BACKYARD VIEW OF THE SUBSTATION, SHOP-BATTERY WING AT LEFT

increased by 12,000 kw., or to a total of 46,500 kw. The combined power capacity of the system will then be more than 90,000 kw.

The new automatic substation, known as the Heights substation from its location in Cleveland Heights, has been installed to take care of the city load which is outside of the two-mile limit of the Cedar Avenue substation and the load of the new Cleveland Interurban Railway line, which is being operated by the Cleveland Railway. This line was described in the issue of this paper for July 31, 1920, page 204. The interurban line extends about two miles beyond the Heights substation, so that its load can be easily taken care of. In addition the station will relieve greatly the load on the Cedar Avenue substation, which is in the most densely populated residential section of the city.

The Heights substation contains two 1,500-kw. Westinghouse rotary converters, each equipped with circuit breakers, transformers and automatic control equipment. Although the station will not carry a load continuously, at least one of the units will be operated from about 4 a.m. until midnight. This machine will be placed on the line automatically, when the cars in its district start running, and the trolley voltage drops below normal. After this happens it will take the unit about forty seconds to get under way and converting energy for the transportation system. This unit will continue to take care of the load until such time arrives as it has been obliged to carry full load for about fifteen minutes. At this time the second machine will be started automatically to take its share of the load.

The two machines will carry the load through the morning peak, the second continuing to operate until it carries only 50 per cent of normal load. Fifteen minutes after this point is reached the second machine will shut down, leaving the first to supply the energy for the day load. Then when the evening load comes on and goes off the second machine will be started and



POWER ZONES OF 2 MILES RADIUS SURROUNDING SUBSTATIONS

2—Viaduct power plant. 3—Windermere. 4—Harvard. 5—West 25th Street. 6—Coutant. 7—Cedar. 8—Heights. 9—St. Clair. 10—Collinwood. 11—West Seventy-third Street.

stopped to meet these conditions. At midnight, when the cars stop running, the first machine will automatically shut down.

Besides being designed to take care of varying conditions as described, precautions have been taken to meet all difficulties that can be foreseen. For this purpose there are eighteen protective relays, each one functioning as conditions for its use arise. As previously mentioned, the details connected with these relays will be taken up in a later article.

The next automatic station which is now under construction, the St. Clair substation, will pick up primarily the load on the St. Clair line between the districts economically served by Cedar Avenue and Windermere substations. The other new automatic substation, the Collinwood, will take care of increased load on existing stations and load of lines extended since the former stations were built. An interesting feature of the load to be served by the Collinwood station lies in the fact that the equipment is needed continuously in this location, near Euclid Beach, where heretofore only a summer load existed. So scarce have homes become in Cleveland that the summer cottages are being converted so as to be used the year round. This, of course, has increased the winter load materially in this locality.

SCHOOL INITIATED TO TEACH MEN PROPER MAINTENANCE OF SUBSTATIONS

The difficulty of obtaining proper maintenance men, sometimes encountered in the installation of automatic substation equipment, was obviated by the Cleveland Railway in the following manner: When the stations were contemplated it was seen that several high-class men were desirable who would be well informed as to the layout of the stations in order properly to locate trouble and maintain the equipment. For this reason Lawrence D. Bale, engineer of substations, who had spent the past year and a half in the study of automatic operation, selected three likely men and initiated a school, wherein he and the men studied extensively the complete working diagrams and schematic diagrams of the stations. Questions were raised as to what would happen if a relay failed to operate, or if certain conditions were present, and the answers were obtained by actually working through the circuits. In addition, a separate circuit diagram was made for each piece of apparatus, so that in case of trouble the exact cause could be located with the least difficulty and in the quickest possible manner.

The equipment for the four automatic substations was designed by the engineers of the Westinghouse Electric & Manufacturing Company, working in close conjunction with those of the Cleveland Railway. In this connection the practical experience of the operating company proved to be of no little value to the designing engineers. In numerous instances the former were able to point out the need for protective devices and relays to provide for varying operating contingencies.

The manufacturer forthwith designed and constructed the apparatus with which to meet these needs. Throughout the long period of development, which now terminates in the successful operation of the new automatic substation, Mr. Bale has worked indefatigably in co-operation with the engineers of the Westinghouse company.

Safety Lights for Safety Cars

Two Additional Lights Are Installed, One at the Rear to Signal Traffic, the Other on the Front Platform

By C. H. COPLEY

Superintendent Springfield Traction Company, Springfield, Mo.

IN OPERATING our one-man safety cars we have had a considerable number of complaints from vehicle drivers that they experienced difficulty in telling when a safety car is standing with doors opened, either to pick up or discharge passengers. Our operators have also complained somewhat that, when operating at night with curtains drawn so as to shut off the light from the inside of car, whenever passengers board the car it is necessary to lift the curtain to secure sufficient light for making change.

To overcome these difficulties we have installed two lights with connections as shown in the accompanying diagram. One of these lights is installed directly over the operator's head and the other at the rear left-hand side of the car, which is the rear right-hand side to a vehicle traveling in the same direction as the car. This lamp at the rear is installed behind red glass, and apparatus and circuits are arranged so that these lights are lighted whenever the doors are open. By referring to the diagram it will be seen that these two lights are in a parallel circuit with two lights used for lighting the inside of the car. For opening and closing the circuit we use a small cylinder that is air-operated. This cylinder is inserted in or connected with the door opening air pipe, so that whenever air is applied for opening the doors the piston of this cylinder is pushed out and this action opens the circuit for the two lights in the interior of the car and closes the circuit for the two additional lights, one over the motorman's head and the other the signal light at the rear of the car. The light over the operator's head is not only of great assistance to him for making change and saving the lifting of the curtains, etc., but it also lights up the front end of the car so that passengers, checkers and others interested in car operation can see just what is taking place at the front end of the car.

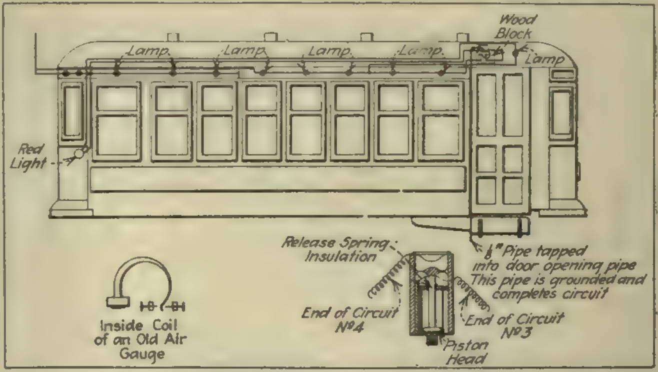

Wood Block
Lamp
Lamp
Lamp
Lamp
Lamp
Red Light
Release Spring Insulation
⅛" Pipe tapped into door opening pipe This pipe is grounded and completes circuit
End of Circuit Nº4
End of Circuit Nº3
Piston Head
Inside Coil of an Old Air Gauge

DIAGRAM OF CONNECTIONS FOR SAFETY LIGHTS IN SAFETY CARS

In the accompanying illustration I have indicated the construction of the air cylinder. The same results can be obtained by using an old discarded air gage. The current to be broken is very small and we have found that an air gage can break the circuit satisfactorily and it is much cheaper to provide where old air gages are available.

Maintenance of Air Brake and Safety Car Control Equipment

Inspection Methods Should Be So Thorough That the Remotest Failures Will Be Guarded Against and Prevented and Tests Should Be Simple But Accurate

BY JOSEPH C. McCUNE
Assistant to District Engineer Westinghouse Traction Brake Company
New York, N. Y.

SAFETY CAR PROVIDES IDEAL SERVICE FOR SUBURBAN SECTIONS

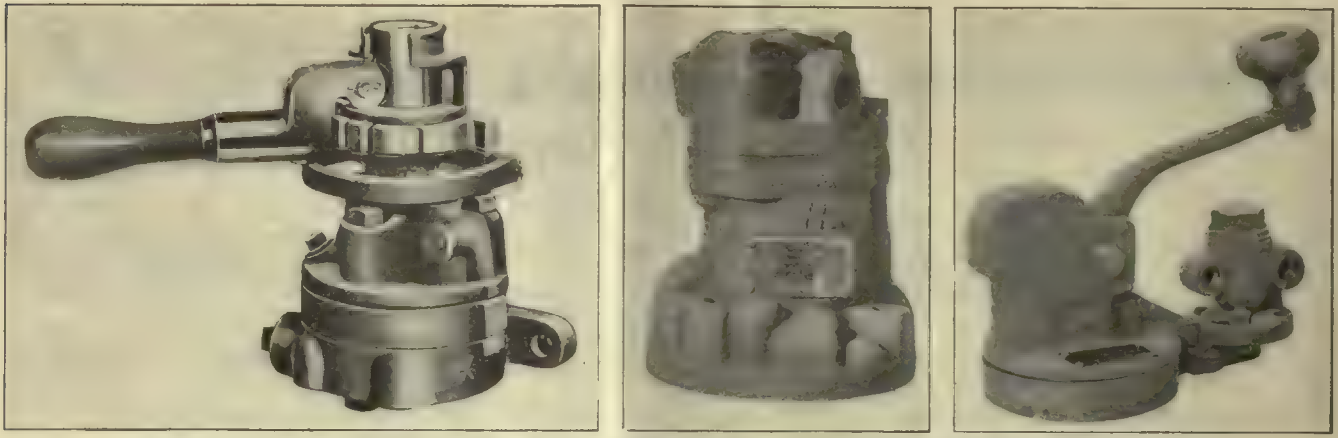
IT HAS been well said that "an ounce of prevention is worth a pound of cure." Preventive measures against all manner of anticipated difficulties are assuming increasing importance in every line of endeavor and in few lines do preventive measures have greater significance than in electric railway car maintenance. Inspection, cleaning, overhauling, renewals, etc., intelligently planned and properly carried out anticipate and thus avoid equipment failures in actual service and permit the uninterrupted sale of transportation, the commodity an electric railway has to offer.

Many preventive measures are in effect only on large properties. The larger the property and the more severe the operating requirements the more obvious the desirability of putting into force the most far-reaching preventive measures. Some of the very largest properties in the East are guided by the principle that anything that can happen will happen and take measures accordingly. Provision is made on such properties to guard against the most remote contingencies, since on account of the vast number of operations, failures are appreciable, even when such failures involve but a minute percentage of the total operations.

It is believed that many of the smaller roads could adopt more extensive preventive measures and thereby obtain very worth-while benefits. Particularly is this true of roads where cars, prior to the introduction of the safety car, were not equipped with power brakes. Precautionary steps on such roads must obviously be less far reaching than if the very large roads mentioned were involved. Possibly the most desirable and practical step is to place overhauling upon a more systematic basis. The article following describes practices which apply more particularly to systems operating large numbers of cars. Yet it is possible to employ, without change, many of these practices upon the smaller roads.

A preventive measure universally adopted is that of frequent inspection of the equipment. Such inspection detects not only actual shortcomings but also conditions which unless remedied are apt to result in failures. How frequent the inspections are to be is a question which must be settled by a consideration of local conditions, such as density of traffic, frequency of stops, climate, etc. But a broad rule which has rather a general application is that cars supplied with air brake and safety car control equipment require the same inspection as other air brake equipped cars. Such cars on large Eastern properties are quite commonly inspected every 1,000 miles.

It is quite frequently the practice to inspect the brake rigging and shoe adjustment daily. Piston travel should be maintained at about 4 in., measured after a full service application made while the car is standing. Running piston travel is about ½ to 1 in. more than standing travel, depending upon the brake rigging. As 5-in. running piston travel is desired, it is evident that the standing travel should be adjusted to about 4 in. If the running piston travel is too great, operators will complain of poor brakes; if too short, brake shoes will drag upon the wheels and cause excessive power consumption.



AT LEFT, BRAKE VALVE. IN CENTER, EMERGENCY VALVE. AT RIGHT, CONTROLLER HANDLE AND PILOT VALVE

The inspection made every 1,000 miles should be more thorough. It is necessary to inspect all parts of the air brake and safety car control equipment. Compressor crank cases must be refilled with oil. They must not be allowed to run dry, for then armatures and bearings will be burned. Compressor brushes need careful attention in order to detect brushes that, on account of wear, require replacement. Air gages require frequent attention in order to keep them properly adjusted. To adjust them accurately a special test gage is demanded, and such a gage ought to be part of the shop equipment. Governor settings vary widely in time from the standard unless readjusted at intervals. The standard setting provides that the compressor shall cut in at 50 lb. and out at 60 lb. The safety valve is set 15 lb. higher; that is, at 75 lb. Noticeable pipe leaks must be eliminated, as additional leakage means unnecessary work for the compressor and a consequent shortening of its life.

To determine if all parts of the air brake and safety car control equipment are in working order the following tests can be employed:

TESTS OF AIR BRAKE AND SAFETY CAR CONTROL EQUIPMENT

Begin the test at No. 1 end of car. Observe that the main reservoir drain cocks are closed, the cutout cock in the governor pipe open (if such a cock is supplied), the compressor fuse in place and "live," the brake valve handle on the brake valve and in "release" position before starting the compressor.

After the governor has stopped operation of the compressor, observe if the air gages at both ends of the car agree, which will require an additional observer

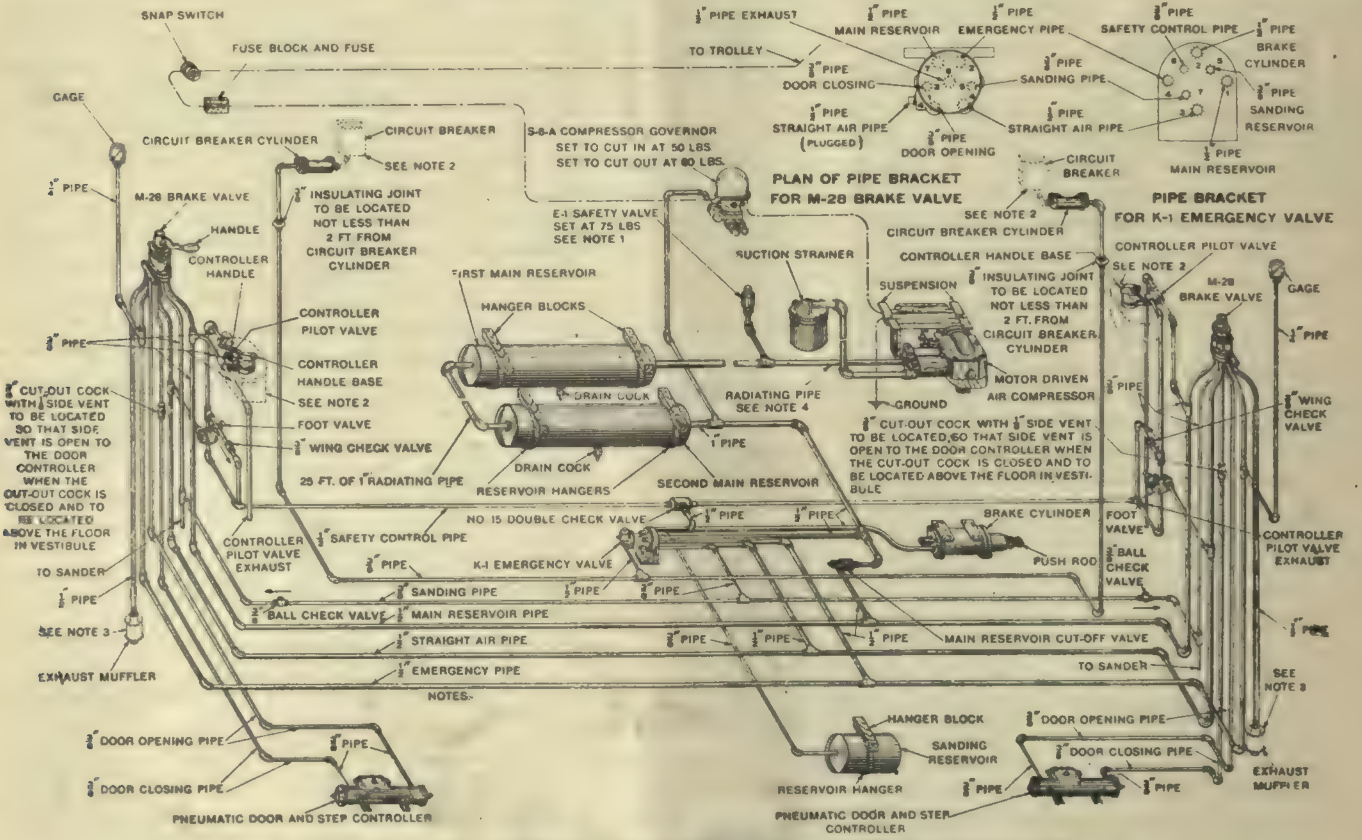
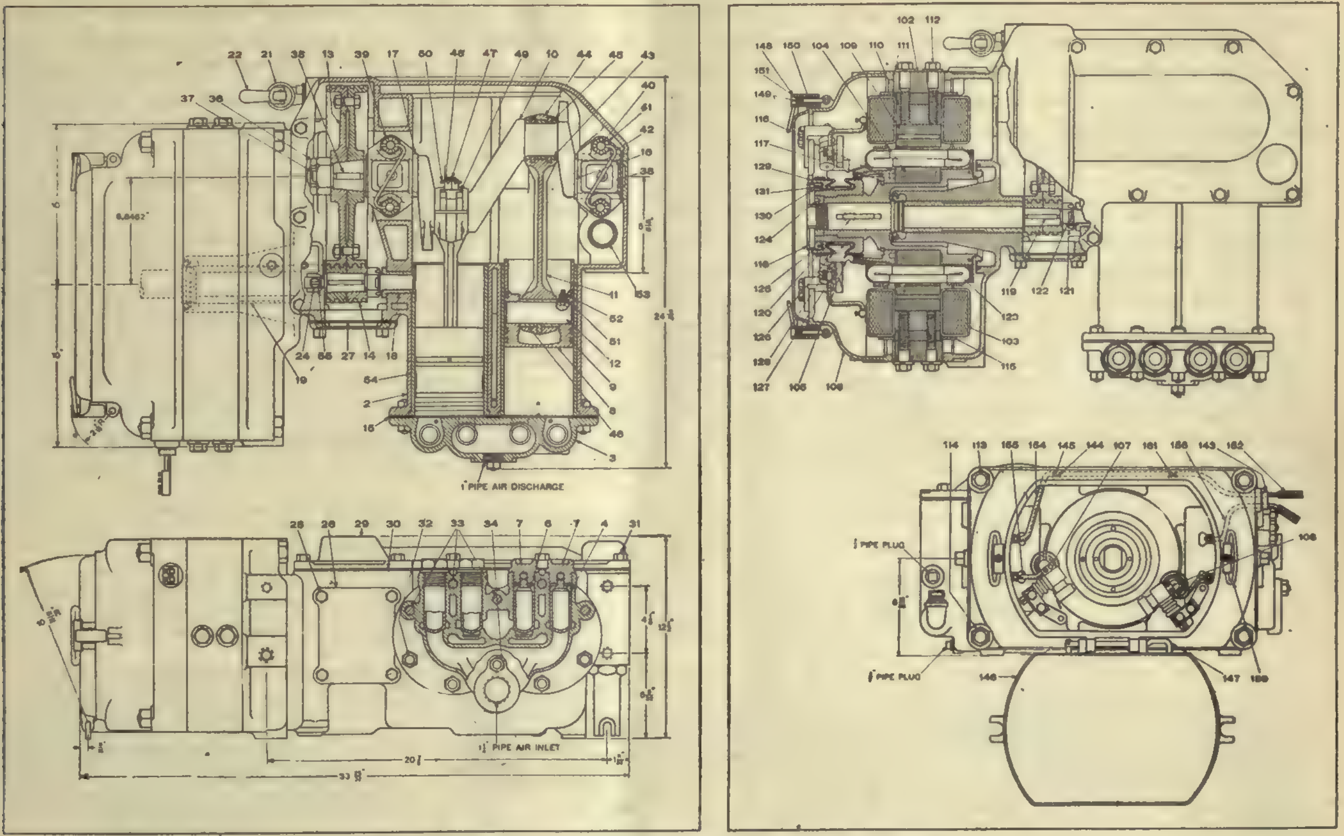


DIAGRAM OF AIR BRAKE AND SAFETY CAR CONTROL EQUIPMENT



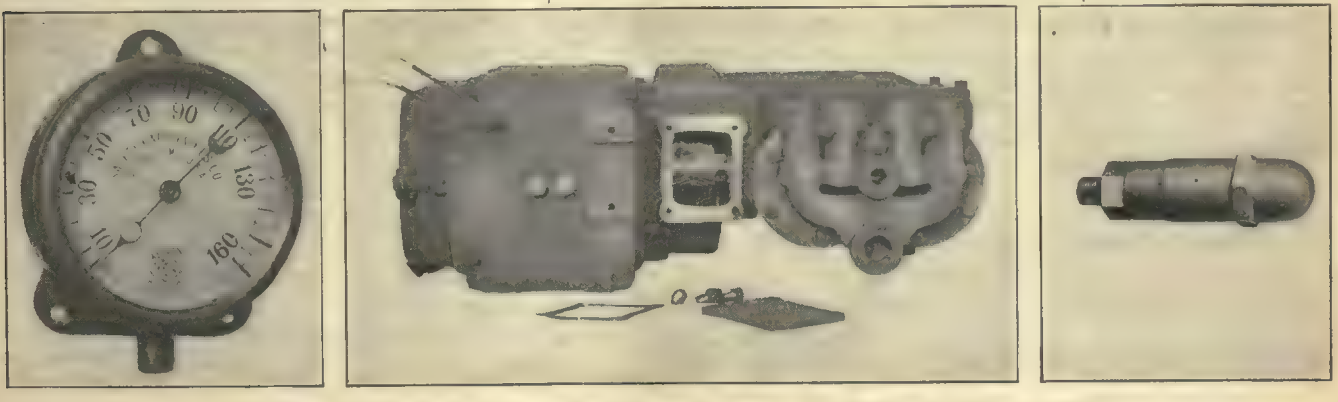
OPERATING PARTS OF TYPE DH COMPRESSORS

The parts with which we are chiefly concerned are: 2—Cylinder and crank case; 4—inlet valve; 6—discharge valve; 8—piston; 10—crank shaft; 11—connecting rod; 13—gear; 14—pinion; 16—rear crank shaft bearing; 17—front crank shaft bearing; 19—motor bearing; 102—field yoke; 103—field coil; 104—armature; 105—commutator; 106 and 107—carbon holders.

for the gage at No. 2 end. If they do not, make certain that the gage hands are not binding. If the hands are not binding, detach the gages and take to a bench for adjustment. A special test gage should be set up at the bench, so that car gages may be checked against it. Better results are obtained if the gages are adjusted at the bench than if adjusted on the car. If sufficient spares are available, correctly adjusted gages can be kept on hand and substituted for those removed from the car, these latter being adjusted at some later time.

After it is known that the air gages are correctly adjusted, make sufficient brake applications and releases to start the compresor or start it by opening temporarily the main reservoir drain cock. Observe that the governor stops the compressor when the main reservoir pressure is 60 lb. If it does not, adjust the governor as described later. Cause the compressor to start again by reducing main reservoir pressure by some means such as brake valve manipulation. Observe the main reservoir pressure when the compressor starts operation. If it is not 50 lb., make the necessary adjustments to bring it to this value. Cut out the governor by closing the cock in the governor pipe, when the compressor will start almost immediately. The safety valve, if correctly adjusted, will open at 75 lb. main reservoir pressure. If it does not open at this pressure, change the adjustment. After this test be certain to open the cock in the governor pipe. If there is no cutout cock in the governor pipe, short circuit the governor switch by the aid of a small wire jumper until the safety valve adjustment is determined.

It is important that leakage from the brake system be reduced as much as practicable. To determine the rate of leakage, after the compressor has stopped operating, wait for about one minute, then place the brake valve handle in release position and hold down on the controller handle. Observe the rate at which the air



AT LEFT, AIR GAGE. IN CENTER, COMPRESSOR. AT RIGHT, SAFETY VALVE gage pointer moves. It ought not to be more than 4 lb. a minute. In this test are included the main reservoir, emergency and control pipes, the pipe to the sanding reservoir, to the air gages, to the governor, the door-closing pipes and the door-closing chambers of the door engines. Move the brake valve handle to "service" position. By so doing, brake cylinder leakage is added to that from the pipes just mentioned. The combined leakage should not be more than 4 lb. a minute. Whether leakage found is in the brake cylinder or the door engines can be determined by closing the cock in each door-closing pipe, which cocks shut off the supply of air to the door engines. After leakage has been located, be careful to open these cocks again. After these tests have been completed, move the brake valve handle to "door open" position. Observe the combined leakage, which, as above, should not be more than 4 lb. a minute. In this case, the leakage includes the door open side of the door engines, whereas in the previous case it included the door closed side. Unless leakage can be detected by sound, it will be necessary to coat the pipe fittings with soapsuds.

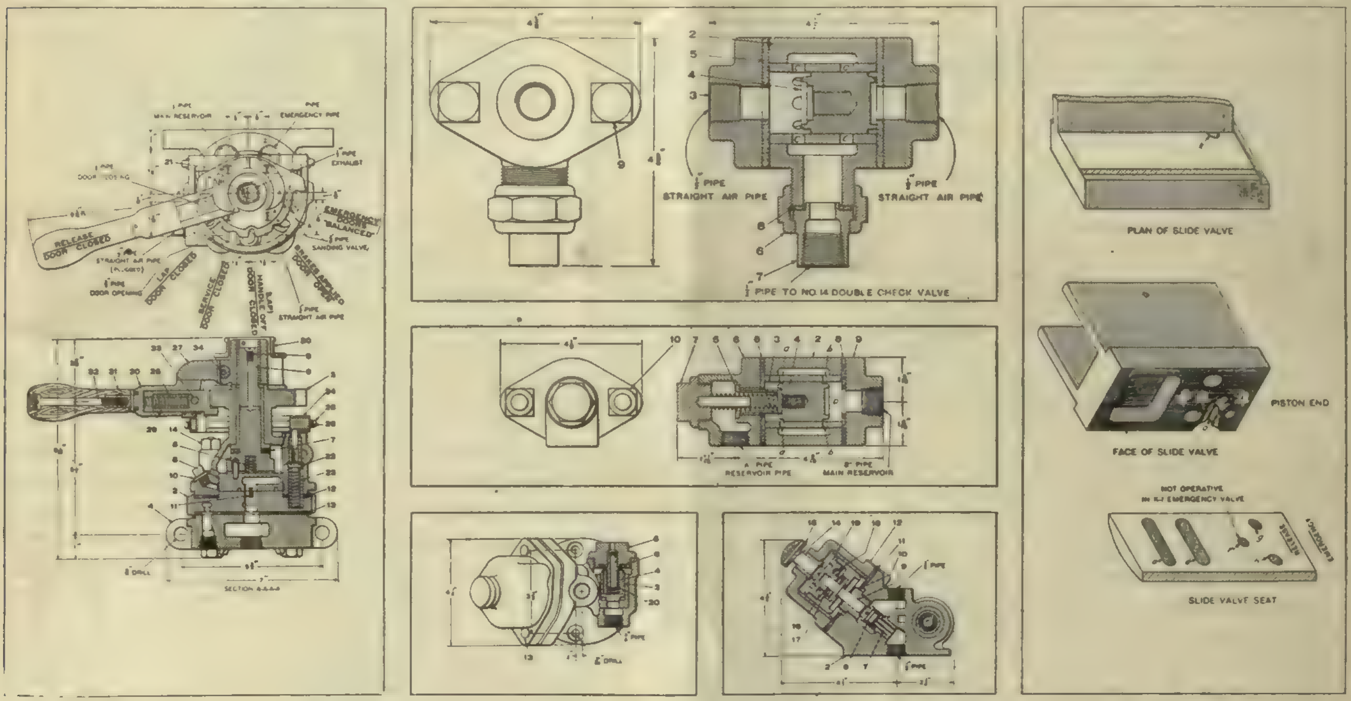
When leakage has been reduced to a permissible value and governor settings have been corrected the efficiency of the compressor can be roughly determined by noting the time the compressor operates in restoring main reservoir pressure to 60 lb. from 50 lb. This time will differ considerably with different cars, but an average time can be readily established, wide variation from which will justify examining the condition of the compressor.

PISTON TRAVEL SHOULD BE MAINTAINED AT FOUR INCHES

After the above tests have been concluded, make a service application from the No. 1 end of the car. Note if the piston moves out promptly to its full travel of 4 in. Then release the application. Make certain that the piston promptly returns fully home. Observe whether there is any fouling of the hand brake, and if so correct it. Make a full service application and then remove the hand from the controller handle. Note if the circuit breaker cylinder piston remains in position. If the piston moves out, examine the combined foot and cutoff valve to determine where the binding or sticking may be.

Make an emergency application by placing the brake valve handle in emergency position, but not releasing the controller handle. If the circuit breaker cylinder piston moves out, examine the combined foot and cutoff valve as above. Release controller handle and note if sand issues from all four sand pipes. If it does not, remove any wet sand found in the sand boxes. Determine if the air pressure has been removed from both doors by opening them by hand. Break a union in the main reservoir pipe between the main reservoir cutoff valve and the brake valve and quickly spring apart the pipes so as to have the pipe fully open. If the flow of air from the pipe leading to the cutoff valve does not diminish considerably, remove and clean the main reservoir cutoff valve. Reconnect the union and move the brake valve handle to release position. Ascertain if the brake cylinder piston returns fully home.

If the brake valve handle is placed in door-open position, the door ought to open promptly without slamming; if the brake valve handle is placed in release position, the door ought to close promptly without slamming. Slamming of doors, in either opening or closing, is caused by lack of proper cushion for the moving piston. The cushion is normally provided by choking the air exhausting from before the piston, so that the moving piston has a tendency to compress it. If a door slams, therefore, examine the large ballcheck valve in the head toward which the piston is moving, since the air can exhaust rapidly if this valve is unseated. Also ascertain if the packing cup of the pis-



PLAN AND SECTIONAL VIEWS OF SAFETY CAR AIR EQUIPMENT

At left, brake valve. Top center, double check valve. Center, main reservoir cutoff valve. Bottom center, foot valve. At right, slide valve and slide valve seat for K-1 emergency valve.

ton is in good condition and well lubricated. If it is desired to change the cushioning effect slightly, screw in or out the choke plug in the center of the door engine head. If the door opens slowly, it may be due to the slowness with which air is admitted to the one piston chamber or to the slowness with which the air is exhausted from the other. Examine the port in each head to determine if it is clear. Also make certain that the packing cups are tight. If the door opens slowly and air exhausts from the gear portion of the door engine, examine the small check valve in the door engine head from which the piston is moving away to determine if it is unseated.

TESTING THE EMERGENCY ACTION OF EQUIPMENT

To test the emergency action of the equipment, charge the system to at least 50 lb., with the brake valve in release position. Leaving the brake valve in release, remove the hand from the controller handle. The brake cylinder piston will at once move out, sand will issue at all four sand pipes, the circuit breaker cylinder piston will knock out the circuit breaker and the air pressure holding the doors closed will be removed. If sand does not issue from the sand pipes, examine the boxes for wet sand. If the circuit breaker is not knocked out, examine and clean the relay valve in the emergency valve. The other two events will invariably occur.

AT LEFT, BRAKE CYLINDER. IN CENTER, DOOR AND STEP CONTROLLER. AT RIGHT, CIRCUIT BREAKER CYLINDER

With the system fully charged and the brake valve in release position, press against the button of the combined foot and cutoff valve and then release the controller handle. Observe if the circuit breaker is knocked out. If it is, the valve actuated by the piston of the foot valve is not seating. Ascertain if the valve is held from its seat by foreign matter or if it is jammed. If the circuit breaker is not knocked out, remove the foot from the foot valve. The circuit breaker will then be opened, unless the valve just mentioned is stuck so as to restrict the opening from the control pipe. Make the same test by releasing the controller handle from power on position and note if the circuit breaker cylinder piston moves out. It is important for this test that the circuit breaker be opened by hand before commencement.

Depress the brake valve handle and observe if sand issues from the adjacent pair of sand pipes. If it does not and the sand boxes are in proper order, examine the sander valve in the brake valve.

Make a full service application by placing the brake valve in service position. Release the controller handle. The circuit breaker should not be opened. If it is opened examine and clean the combined foot and cutoff valve.

All of the above tests involving brake valve manipulation should be repeated from No. 2 end of the car.

If it is found that with the brake valve handle in release position and the controller handle held down the brakes cannot be released it is probable that some defect exists in the control system. Such defect is generally due to a bit of pipe scale lodging under a valve seat. With new cars, difficulties with pipe scale will be experienced until the scale works out of the various pipes. If the brakes cannot be released with the brake valve handle in release position, hold down on the controller handle and determine if there is a flow of air from the controller pilot valve atmospheric exhaust. If there is such a flow, clean the lower pilot valve and give it a good bearing on its seat. If there is not, examine the No. 15 double check valve to determine if it is seating against the seat away from the operating brake valve. If a satisfactory seat is being made, no air will flow when the pipe leading from the check valve to the non-operating end of the car is broken. If no difficulty exists with the double check valve, break the pipe connection leading from the relay valve of the emergency valve to the circuit breaker cylinders. If air passes the relay valve, this valve is at fault. If no air passes the relay valve, examine and clean the emergency valve.

If the brake applies when not intended, excessive leakage must exist from the emergency pipe and its connections, which include the door-closing sides of the door engines. This piping must be tested for leaks, the removal of which will eliminate the trouble.

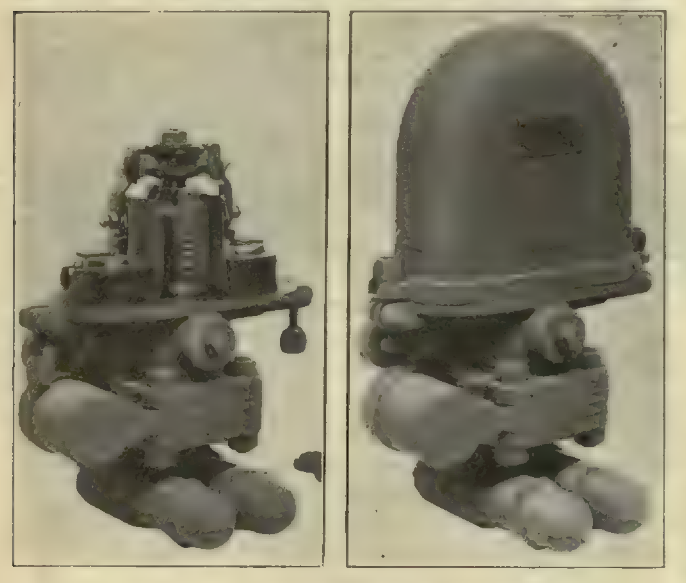
In case the circuit breaker is opened when the controller handle is released following a full service brake application, test the control pipe for leakage.

DETERMINING CAUSE OF ESCAPING AIR FROM BRAKE VALVE EXHAUST

To determine the cause of air escaping from the brake valve exhaust, move the brake valve handle to "handle off" position. If the flow of air then continues, it is due either to a leaking rotary valve or to a defective gasket between the brake valve and pipe bracket, though the former is the most common cause. If air escapes from the brake valve exhaust only in release position, it may be caused either by the emergency valve or by the brake valve at the other end of the car. To ascertain positively which of these is the source, disconnect the straight air pipe near the brake valve from which air is escaping. If no air issues from the section attached to the emergency valve, the trouble is with the brake valve. If air does issue from this pipe, disconnect the straight air branch pipe leading to the emergency valve. If air issues from the section attached to the emergency valve, the trouble is due to a leaking slide valve or a defective gasket in the emergency valve. If air does not issue from this section, the trouble is with the brake valve at the other end of the car. Air escaping around the sander valve stem can frequently be stopped by the operation of the valve a few times.

Escape of air from the lower vent port of the combined foot and cutoff valve, at either end of the car, with the brake released, indicates leakage around the upper of the double valves and its stem. Escape of air at either vent port, at either end of the car, with the brakes fully applied, indicates that the seal of the valve adjacent to the vent is not tight. Leakage by the stem of the knob indicates that the valve on the end of the stem is not seating. If, with the brake fully applied, air escapes at the pilot valve exhaust when the controller handle is released, examine the by-pass check valve for leakage.

Air issuing at the operative end of the car from the pilot valve exhaust with the controller handle held down is caused either by the lower valve not seating or by its making a poor seat. With the controller handle released, escape of air at the same exhaust is due either to the upper pilot valve, to the lower of the double valves in the foot valve or to the by-pass check valve. By successively disconnecting pipes, leakage may be traced to one of these three sources. In the event that the trouble is discovered to be with the upper pilot valve, make certain that the lever in the handle base is so adjusted that the upper pilot valve is caused to seat when the controller handle is released. The contrary applies to the lower pilot valve. Escape of air from the pilot valve exhaust at the non-operative end of the car results either from a leaking upper pilot valve or from a double check valve which does not seat properly.



ELECTRIC COMPRESSOR GOVERNOR

Issuance of air from the exhaust port in the main body of the emergency valve can be stopped by fitting the emergency slide valve to its seat. Air escaping from the exhaust port in the casting containing the relay valve with the brakes released comes either from a defective gasket or a poor seal made by the small end of the emergency piston. Leakage by the relay valve in release position is evidenced by air escaping from the circuit breaker cylinders.

GENERAL REPAIRS TO COMPRESSOR AND ACCESSORIES

It is advisable to follow a systematic schedule in making general repairs or overhauling equipment. Such schedules are carefully laid out upon all large properties. Smaller roads will find it decidedly practical from an economical standpoint to follow their example. Overhauling is generally upon a time basis and the interval adopted is usually one year. Emergency valves may require more frequent cleaning, determined by local conditions. A yearly basis, however, will probably be found satisfactory for the other items of the air brake and safety car control equipment.

The efficiency of a compressor may be determined by a suitable operating test and this efficiency used to determine whether or not the compressor is in need of overhauling. Such procedure is quite general in connection with steam-driven compressors on steam railroads, but is very exceptional on electric roads. Overhauling of motor-driven compressors is generally on a yearly basis, at least on properties in the East, without reference to the actual condition of a particular compressor.

To make satisfactory repairs to a compressor, it is necessary to provide a bench with such air and electrical connections that the compressor may be operated under pressure. It is advisable to have sufficient spare compressors in order that time may be available to do all necessary repairing to the compressors before their return to service. At each overhauling drain all oil from the crank case and clean up the compressor portion thoroughly with gasoline. Examine piston rings to ascertain if they have been making good contact against the cylinder walls and in their grooves. If not, replace with new rings, as the efficiency of the compressor and any tendency to pass oil will thereby be considerably bettered. If many compressors are overhauled, a clamping device to permit the easy installation of segmental rings is a worth-while addition to the shop equipment.

After the cylinder walls become worn from long service, the efficiency of the compressor can only be maintained by reboring or rebushing the cylinders. After the cylinder walls have been reduced in thickness by reboring, it is necessary that they be rebushed. Two sizes of repair piston rings can be furnished for DH-16 compressors, one size $\frac{1}{16}$ in. larger than standard and one $\frac{1}{8}$ in. When rings $\frac{1}{8}$ in. over size are no longer able to take care of wear, it is necessary that the cylinders be rebushed.

The valves in the cylinder head require cleaning, any carbonization being removed. Valve seats must be refaced when it is evident that valves are seating badly. This work must be so carried out that the valve lift is not changed from that specified for the compressor. Tools are manufactured by which this work may be readily done. It is important that the slope of the seat be retained as it existed in the original design in order that the bearing area of the valve may not be changed.

Crankshafts may require new bearings. Connecting rod bearings must be tightened up and shims adjusted. Bearings must be rebabbitted when sufficiently worn. Nuts throughout the compressor demand tightening. Pinion and gear, the pinion particularly, need examination, for the pinion after long wear may require replacement.

Armature and field coils of the motor should be blown out, then cleaned with gasoline, dried and finally shellacked or varnished. Bearings must be tested by checking the armature gap in the usual way. After commutators have worn down to the mica, turn and reslot. Brushes ought to be free in their holders. The proper spring tension, with adjustable brush holders, is 4 and 5 lb. per square inch of brush area.

When the compressor is reassembled, care must be taken that the cylinder head is drawn up tightly against the cylinder casting. If cork cylinder gaskets are used, they can be held in place by shellacking the side which goes against the cylinder casting. If the other side is coated with graphite grease or finely powdered graphite the cylinder head may be removed without tearing the gasket.

The strainer is not generally given the attention warranted by its importance on account of the vital bearing its proper functioning has upon the life of the compressor. Many compressor troubles are due to neglect of the strainer. Compressors have been found in service without any strainer. The strainer needs to be blown out frequently, the more frequently the better. At the yearly overhauling the hair should be removed and cleaned.

Overhauling of governors should be done at a suitable bench and not attempted upon the car. Leather seats and gaskets when found leaking need to be replaced. The governor strainer must be given attention. In time, valve cylinders will have to be rebushed. To adjust the setting of the governor, remove the caps covering the regulating nuts and screw down the cut-out regulating nut until the compresor cuts out at approximately the pressure desired. At the same time or possibly before this nut is adjusted, back off the cut-in nut until it is certain that the cutting-in point is below the cutting-out point. If this is not done, it will be difficult to make proper adjustment. After the cutting-out point has been set, screw down on the cut-in regulating nut until the compressor cuts in as desired. The caps covering the regulating nuts must be in place and tightened when the final adjustments are made, as otherwise the adjustment will be disturbed when they are put back. At the yearly overhauling testing the adjustment of the safety valve should be carefully and accurately done. This setting should be 75 lb.

CARE OF EMERGENCY AND OTHER VALVES

The emergency valve must be gone over at least once a year or if dirt, gum or verdigris accumulates in sufficient quantity every six months. It is very desirable that the overhauling be done at a bench provided with means for testing the valve under pressure. A suitable test rack was described in the Aug. 21 issue of this publication in connection with an account of safety car operation in Kansas City. If any slide valve leakage is found, the slide valve must be ground in or spotted to overcome it. Gaskets and leather seats must be renewed when found leaking. The cleaning of the relay valve cannot be overlooked. Relay valve and main piston must move freely in their cylinders. When new piston rings are installed, ascertain that they make a tight and uniform fit in their groove. New rings can be worn in by moving the piston back and forth by hand or by a proper tool. Good practice requires that the ring be fitted to the cylinder rather than the cylinder to the ring. It goes without saying that piston and slide valve should be returned to the body from which removed. Emergency valves may be applied, however, to any pipe bracket. The lubrication of the emergency valve has been described in a previous article.

The circuit breaker cylinder, the double check valve, the main reservoir cutoff valve and the combined foot and cutoff valve must all receive attention at the same time as the emergency valve. Cleaning is the principal work to be done. Gaskets and seats must be replaced when necessary to overcome leakage. Valves in the combined foot and cutoff valve or in the pilot valve when discovered leaking will have to be ground in.

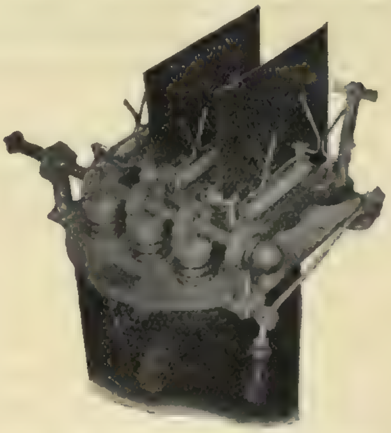
Gaskets and leather seats require renewal when found leaking. Handles can be rebushed when they become loose on the brake valve stem. The sander valve needs to be inspected for leakage. Worn latches require replacement. The wearing strip bearing on the bail will have to be renewed before it becomes too thin. Brake cylinders ought to be cleaned yearly. Door and step controllers can be on the same basis. Cup leathers worn and cracked must be replaced. All leathers should be lubricated. The gear case must be kept filled with a suitable non-fluid oil or a hard grease.

In following out the tests for locating troubles as described, charts, diagrams and sectional views of the character illustrated will be found of great assistance to the workmen. The manufacturers of the equipment have these in convenient size and can supply them as required.

Improved Electrolytic Lightning Arrester

MOUNTING the transfer switch and gap structure on the tank top is one of the main features of the 1,000-7,500-volt type AK lightning arresters recently placed upon the market by the Westinghouse Electric & Manufacturing Company. This arrester is self-contained and of the indoor mounting form. Transfer switch, horn gaps, charging resistance and short-circuiting devices are all located on the tank top.

The transfer switch is of the sliding rod type, consisting of a rod with sections of conducting and insulating materials, operating through five self-aligning contacts, supported by the cover. Three middle contacts are insulated from the tank cover by porcelain pillar insulators, but the end contacts are connected directly to the tank top through their metal supports and form a part of the ground circuit. A ball handle with guard provides an easy method of operating the switch.



LOW-VOLTAGE ELECTROLYTIC LIGHTNING ARRESTER

The horn gap, charging resistance and short-circuiting device are mounted on insulating bases located between barriers and on the tank top. Short-circuiting metal strips are carried by insulated supports attached to a shaft. The shaft or rod is operated by means of a rope or handle against a spring which normally holds the short-circuiting device in the open position.

Use of Solid Lubricants

Two Functions of Making Rubbing Surfaces Smooth and Slippery Are Supplied by Solid and Semi-Solid Lubricants

THE Department of Scientific and Industrial Research in Great Britain has just issued a memorandum on solid lubricants. Certain points discussed, of interest to electric railways, are abstracted below:

On introducing a solid lubricant between otherwise unlubricated surfaces the finely divided particles of the lubricant associate themselves with one or the other of the rubbing surfaces, filling in the pores and depressions, and acting to some extent as a smoothing and polishing agent. As a result, the coefficient of friction is reduced and the solid friction between the more or less rough original rubbing surfaces is replaced by the lesser solid friction between the smooth surfaces formed by the solid lubricant.

When oil lubricated surfaces remain at rest for some time the oil film is more or less completely squeezed out and a certain amount of solid contact takes place. As a result, the starting effort is much greater than the running effort; in fact, the static coefficient of friction usually approximates to the values applying to dry friction. The high values for the static coefficient of friction explain the great effort often required to start machinery from rest and form one of the chief reasons why ball and roller bearings are used, as with surfaces in rolling contact there is practically no difference between the static and kinetic coefficient of friction.

The effect of the use of a suitable solid lubricant or a solid colloidal lubricant is to reduce the tendency to abrasion and to produce smoothness of the surfaces. As the solid lubricant cannot be displaced by pressure, the static coefficient of friction is reduced as compared with the result obtained when oil alone is used, assuming that the solid lubricant is of such a nature and used in such a manner that it has increased the smoothness of the rubbing surfaces.

FLAKE GRAPHITE FORMS SLIPPERY SURFACE

Makers of the flake variety of graphite claim that this type of graphite lends itself better to the production of very smooth and slippery surfaces than the amorphous varieties; in bearings with rough surfaces the flakes adhere to one another and easily build up a smooth surface. When the bearing surfaces are reasonably well finished this "building up" action of the flake graphite does not appear to be of special value; in fact, it may be detrimental where small clearances exist, particularly if fed in excess.

A good solid lubricant must possess ability to adhere to metallic surfaces and it must be capable of producing a smooth surface. Graphite possesses both of these properties to a marked degree. Talc and mica do not adhere to surfaces as well as graphite does, nor do they produce so smooth a surface.

In the case of well-finished rubbing surfaces very finely divided graphite must obviously be used, and the coating of the surfaces is easier to accomplish than with rough surfaces. Under these conditions, makers of amorphous graphite claim that flake graphite, when used in excess, is apt to build up too thick a surface and reduce the working clearance to a dangerous extent, whereas with amorphous graphite excessive use can have no ill effects; the soft amorphous grains are easily crushed; in fact, a surface of fine amorphous graphite under pressure moves within itself like a film of oil.

The admixture of a hard solid lubricant, like hard talc or mica, with a grease, particularly if an excessive amount is added, may cause a great deal of continuous uniform wear, yet with no cutting or excessive heating of the bearing.

When a bearing gives warning by heating the usual procedure is to resort to the use of a fixed oil, like castor or rape oil, or to a viscous mineral oil, like steam cylinder oil; the effect of using such oils is to produce a better film, which separates the metallic surfaces and reduces the temperature. When the surfaces have commenced seriously to abrade one another oils may prove of no avail and solid lubricants must be used, such as graphite.

MILD ABRASIVES CURE HOT BEARINGS

Flowers of sulphur and white lead are often used to cure hot bearings; they act not so much as lubricants, but rather as mild abrasives; they grind away the rough spots and produce a smooth surface. Much more drastic remedies, such as salt, brick dust and grindstone dust have been successfully employed in very serious cases of large hot bearings; their function is quickly to grind away the rough parts which have commenced to seize. They may be applied mixed with thick oils. The oil should be applied in a liberal manner in order that it may clean away the gritty powder after it has done its duty.

Speaking generally, semi-solid lubricants are always improved by the admixture of a small amount of finely pulverized pure flake or amorphous graphite. In this case a softer grease, or a grease containing a lower viscosity oil, can be employed than that used without the addition of a solid lubricant. Exceptions are bearings with highly polished surfaces and small clearances and high-class ball and roller bearings, for which colloidal solid lubricants are the only solid lubricants that can be considered.

There are numerous experiences which testify to the value of solid lubricants, and graphite in particular, for use in bearings. One British railway reports that good results have been obtained by using either colloidal graphite or flake graphite mixed with their ordinary engine oil.

The graphite is used for regular running, but only as a temporary remedy, whenever important bearings are inclined to heat. Several railways report that by continuous use of colloidal graphite mixed with pure mineral oils they have obtained excellent results on heavy duty bearings which previously gave trouble, even when using oils heavily compounded with fixed oil. Not only did the bearings run cooler but also with an appreciable reduction in consumption of oil, and without flocculation of the graphite.

Bulletin No. 7 of the Federated American Engineering Societies announces the addition of the Cleveland Engineering Society to the list of charter members. This bulletin also discusses the form of organization, showing why a federation form is superior for the purposes involved to any new all inclusive body of individuals which could be found. It further emphasizes the retention of autonomy by each member society and also discusses the manner of the selection of representatives.

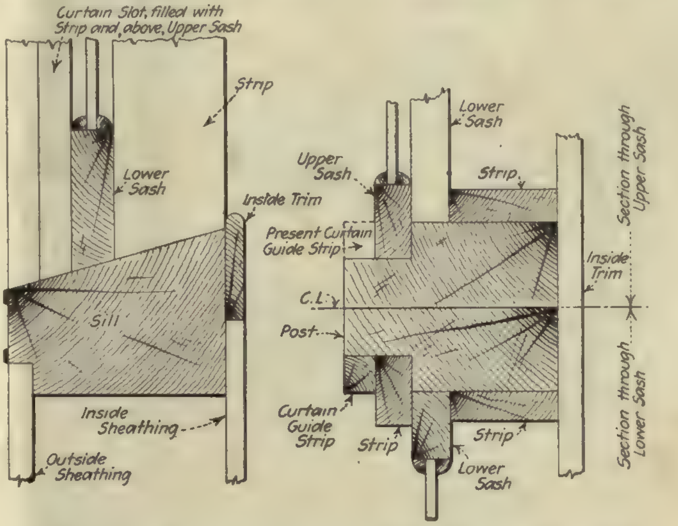
Modifying Open Cars for Prepayment Service

Connecticut Company Rebuilds Fifty Cars for P.A.Y.E. Operation—Although Company Plans to Use Them Only for Summer Open Service, Cars Are Adaptable to Conversion to Closed All-Year Types

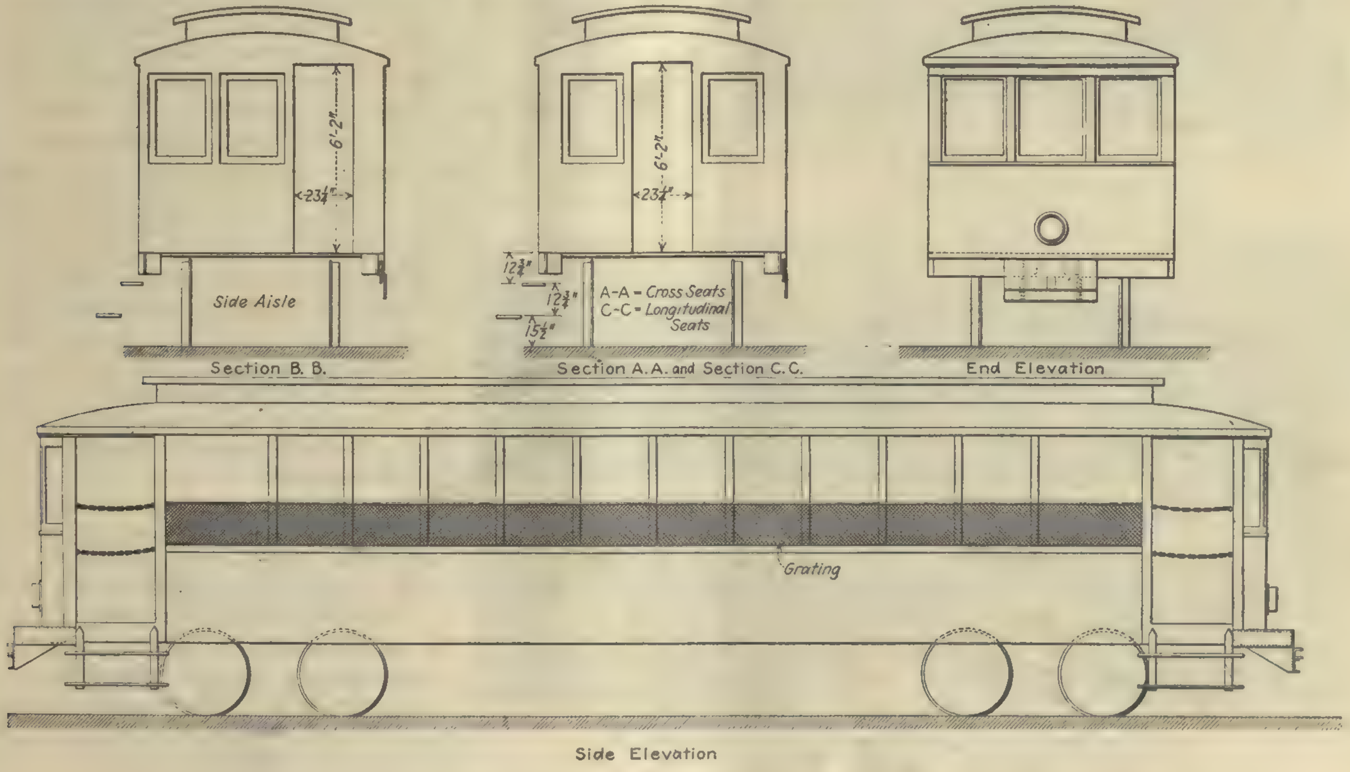
AS THE Connecticut Company approached the summer months it was evident that it would have a large amount of open equipment which would be useless under the zone system of fare collection, which was in vogue on the lines of the company during the spring. While some use could be made of open equipment for a few standard runs on express service, with one cash fare for the entire run or any part of it, there were still many of the more than 400 open cars which would necessarily be idle under a zone system. Plans were therefore made to change over 100 of these cars, as a first step, in such a way that they could be used on the zone system with the same sort of fare collection in use on the ordinary closed car.

The Connecticut Company's open cars, seating seventy-five passengers, were of the ordinary reversible-seat, open-platform, two-step running-board type. One of these is shown in an accompanying illustration.

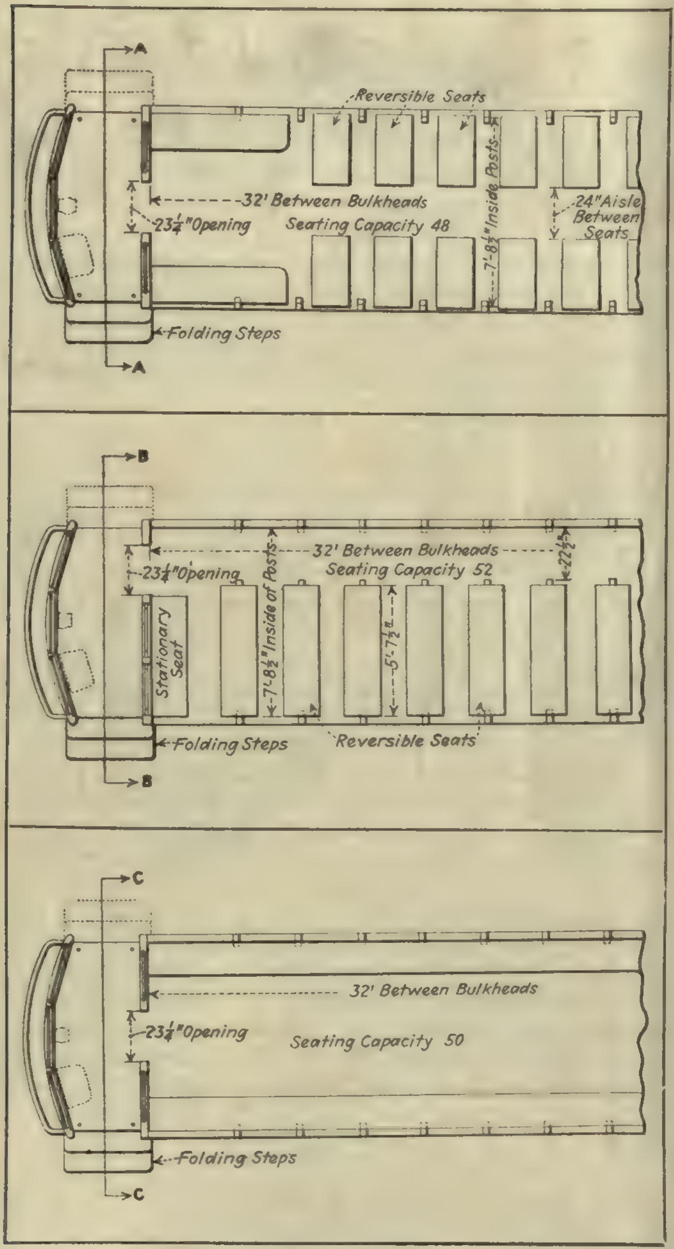
Various seating arrangements for the rebuilt cars were suggested which would allow ingress and egress of passengers in such a way that fares could be collected on the zone system. A sample car was constructed on each of three seating arrangement designs. The three designs are shown in an accompanying drawing and interior views of the three finished cars are shown in an accompanying illustration. One of these is the ordinary longitudinal-seat car, largely designed for rush-hour extras. This car will seat forty-eight passengers as now arranged. The second style is the cross-seat, with a center aisle, and arranged to seat fifty passengers. The third style is the side aisle arrangement with cross seats, which provides a seating capacity of fifty-two. Original plans called for fifty cars with longitudinal seats, ten with the cross-seat center-aisle plan and forty with the cross-seat side-aisle. It was soon evident, however, that the complete 100-car program could not be carried out in time for use during the summer of 1920 and the program was reduced to fifty. The plans



HOW IT IS PLANNED TO SET WINDOWS, USING THE PRESENT CURTAIN POSTS



ELEVATIONS SHOWING DETAILS OF CONNECTICUT COMPANY'S MODIFIED OPEN CARS



THE THREE SEATING ARRANGEMENTS USED ON THE MODIFIED OPEN CARS

called for using the existing material in the open cars to make the three-quarter width seats and to make the longitudinal seats, but the cross seats for the center-aisle cars were to be purchased. As these orders had already been given, on the basis of the original program of ten cross seats, and as there were on hand enough cross seats in abandoned cars to equip three more of the new cars the following program was decided upon and carried into execution: Thirty-six longitudinal-seat, thirteen cross-seat, center-aisle, and one, the sample, side-aisle car. It was planned that the cars with longitudinal seats would be used for rush-hour extras and those with cross-seats in suburban service.

Most of these cars have already been put into service, and the reports received by the company indicate that the cars are very well liked. It is interesting to note that in some localities where both longitudinal and cross seats have been provided there is a demand that all the cars have longitudinal seats; in other communities the demand is exactly the opposite, *i.e.*, that all the cars should be of the cross-seat type.

These cars are arranged to be operated on the "pay-as-you-enter" scheme, the same as the standard two-man car. Of course, under the zone system as worked by the Connecticut Company, entrance was by the front platform and exit at the rear, using "pay-as-you-leave" collection. Since these cars are built to collect fares the same as a regular car, they can now be used as "pay-as-you-enter" cars on the present fare system.

In the actual change-over of the cars, attempt was made, of course, to utilize as much of the original open car material and construction in place as possible. The first plan called for the use of sheet iron for the sides, shaping this to the curtain posts. As it was impossible to get the material in time to make the reconstruction for this summer's period this plan had to be abandoned. A second scheme was then evolved to use agasote or nevasplit, putting this in the curtain slots, thus again following the shape of the posts. This material could not be promised on time, and this plan also had to be abandoned. The third and final scheme then adopted was to use straight siding material which could be secured locally. This necessitated, of course, bolting on to the existing sill of the car an additional sill or extension to bring the bottom support of the sheathing out in line with the upper part of the curtain posts. In bolting on this additional sill the old step-bracket holes were used. Flooring was brought out flush with the outer edge of the extended sill. An intermediate strip was set into the curtain posts about half way between the window ledge height and the sill and made flush with the upper part of the curtain posts and the lower sill. Sheathing was then applied vertically, as indicated in an accompanying photograph.

Care was taken in making both the window ledge and in inserting the intermediate strip so that it would be easy, without any additional rebuilding work, to install an inside lining in the car so that it could be used for all-year-round service. This inside lining has already been applied on all of the cross-seat cars that are in service.

THE ORIGINAL DOUBLE-TRUCK OPEN CAR WITH DOUBLE RUNNING BOARD

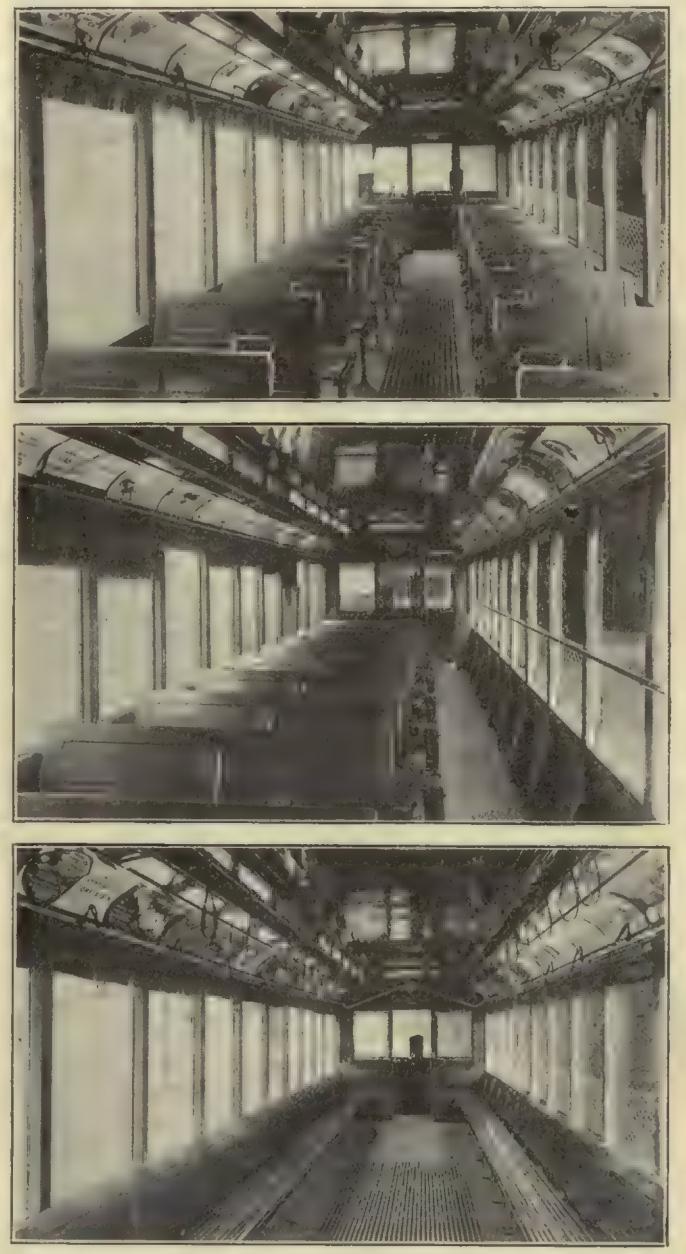
Since, however, the present plan contemplates using these cars only in the summertime no windows or doors have been provided, but the curtains have been retained. Bottoms have been cut off the curtains, so that they now reach only to the window ledge rather than to the floor as originally. The old flooring on the cars was used as a base and they were refloored on top of this to 8 in. in front of the longitudinal seats on the longitudinal-seat cars and out to the end of the cross seats on the cross-seat cars. The original slats, which ran crosswise on the open cars, were taken up and laid longitudinally on the rest of the floors of the remodeled cars.

As stated above, the same seats and backs were used in the longitudinal and the side-aisle cars as had been previously used in the open summer cars. In the case of the side-aisle cars these were merely cut down and the same hardware used. In the case of the longitudinal cars all of the hardware was taken off, of course, the remaining material being used to construct one long longitudinal seat on each side of the car.

While the remodeling was being done it was decided best to put a vestibule on, and this vestibule was made ready to take a one-door wide, two-piece folding door of the same type as used on other single-entrance cars of the company. The old dashboards were, of course, removed and new dashers installed as part of the new vestibule.

There was no change whatever in the framework of the car. A stanchion was provided on either side of the entrance in the vestibule and no arrangements were made for a door from the vestibule to the car.

With reference to the steps, all of the open cars were, as seen in an accompanying photograph, provided with a two-step running board. In making the remodeled car the same steps and brackets were used as far as needed, the unused part of the running board being cut off without the necessity for removal. It happened that the two front brackets were so spaced as to be in just exactly the right location for the steps needed to enter the vestibule. These steps are not now arranged to be operated from the motorman's or conductor's position, but must be operated manually from the outside. If doors are added, it is planned to have these steps worked by a mechanism which operates when the doors are opened and closed.

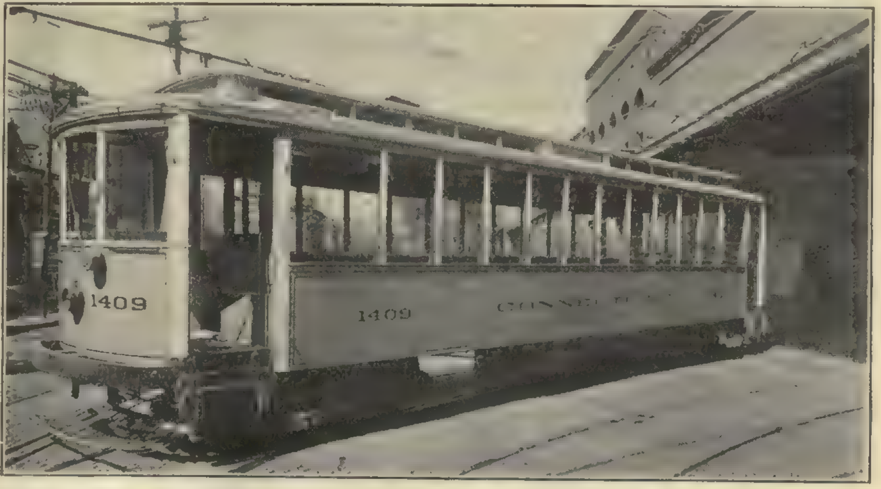


INTERIOR VIEWS SHOWING THE THREE SEATING ARRANGEMENTS

The accompanying illustrations show the arrangements which have been made to take windows in case it is decided to make the cars all-year-round cars. It is planned to set the upper sash in the present curtain slot and place a solid strip below the upper sash so it will be permanently in position. The lower sash will operate between this strip on the one hand and a strip nailed against the post on the other hand and will raise its entire height. In the drawings illustrating the plans for the addition of windows the strips there indicated, the inside sheathing, the inside trim and the sash are not now installed in the cars.

Some weight has been added to the cars, but the exact amount is not yet known.

All of the cars are equipped with O-50 trucks, with 4 G.E. motors and with G.E. control, either K-6 or K-35.



HOW THE CAR LOOKS AFTER RECONSTRUCTION, READY FOR PLATFORM ENTRANCE AND ZONE FARE COLLECTION

No change was made in the lighting or the ceiling of any of the cars with the exception of refinishing.

It may be of interest to know what the cost of this change-over has been. The first three cars fitted out as samples were prepared in the company's Grand Avenue carhouses, New Haven, by the company itself. The rest of the work was done by contract and the cost per car has been approximately $1,000.

Most of the responsibility for this change-over, including the making of the plans, has rested upon H. C. Beebe, superintendent of equipment, from whom most of this information was obtained.

Suggestions to Foremen

Be a Salesman and Sell Satisfaction—Lead, Not Drive, the Keynote of Success—Character Study Essential

By John F. Spencer

IF YOU are a foreman and have to handle men your problem is the same as that of a salesman. If a man goes into a store and a salesman sells him something good he goes out satisfied and remains satisfied, so if a man comes to you and wants something, you, as foreman, must see that he is satisfied if it is in your power to do so. If you cannot give him what he wants state the reason and only let him leave when he is satisfied you cannot do what he desires. You, as foreman, are a salesman selling satisfaction, not goods.

Ninety per cent of the men know the conditions in the shop, factory or power station about as well as you do, so it is useless to try to fool them or put them off. Treat them so as to retain their friendship and respect so they will come back for another favor. This is the policy of any good salesman.

You should never be too busy to talk to a man. It is human nature to like to deal with a busy man, for that is the type that gets results. If you are not busy you are not selling anything. Do not read the newspaper or look out the window when a man tells you something about a car, but give him your attention. The inattentive treatment might cause him not to come back to tell you of other troubles which, if remedied, would prevent serious accidents.

Do not try to do too much for your men or to patronize them. They are quick to detect insincerity and you will spoil all discipline. Do not be familiar with the men or put your hand on their shoulders. They are sensitive and have no use for such behavior.

If you reprimand a man do it without losing your temper and the next time you meet him engage him in pleasant conversation not connected with his work. This action will convince him there was nothing personal in your reprimand.

You should be a teacher to your men. Never refuse to show a man the schedule, the plans or the working of a machine. The more you explain a thing the better you understand it yourself. Do not tell a curious man to see some one else. Make the question an opportunity for getting better acquainted. Your aim is to lead your men and not drive them, so no legitimate opportunity for better personal relations should be neglected.

Never dismiss a man with an order until he understands exactly what is wanted. You will find men different, and it pays to study character. You may have to talk fast to blond men and slow to brunette men in order to make them quickly understand your order. Different men require different treatment.

Always be frank, truthful and sincere with your men. Use good judgement in making promises and, above all, do not make promises you cannot carry out. Favoritism will cause endless trouble, while a square deal and consideration for every man will get co-operation in the work. Nothing is too slight to watch in avoiding charges of favoritism. Do not go on fishing trips, theater parties, etc., with your men unless all go.

There are many incidental things not directly connected with your duties as foreman that will help you handle men. Learn all you can about the fire protection, safety and sanitary appliances. A knowledge of first aid is an invaluable asset as it affords opportunity for your talking to a man in an emergency when he is not so critical in his attitude and at the same time you are placing him under a slight feeling of personal obligation to you for your aid.

Let your men talk and make suggestions about the work. Many of them will be valuable and every man likes to express his ideas.

You should keep a complete record of all your men in great detail. You should know whether they are married or single, whether they own or rent their homes, pay high or low rent, where they live and their telephone numbers.

You can also help them by posting notices of athletic events, etc., on the plant bulletin board.

A large measure of your success will be determined by your ability to handle your men, for, to the men, you are the company.

Insuring Current for Bond Testing

BOND testing on street railway tracks is generally unsatisfactory because the amount of current flowing through the rails is not known. The Wilkes-Barre Railway Company, under the direction of E. A. Hoffman, chief engineer, has devised a method of testing which removes this uncertainty.

The company has several small portable resistance welders used for welding joints, bonding tracks, etc. To insure a current flowing through the rail to be tested, the terminal of one of these welders is grounded to the rail, and the joints between the machine and the power house are tested approximately every 300 ft., or every four or five joints to each setting of the machine. The welder weighs only about 80 lb. and is easily moved about by two men. In open track two or three men are used. About 50 per cent of the track of this company is paved, and for testing this portion two laborers in addition to the men necessary for the testing operations are used to open up and relay the paving around the joints.

All the track on the system, consisting of approximately 100 miles, will be tested out this season. It is expected that the testing crew will average about 1 mile a day, repairing all bad joints and bad bonds with the welder as they proceed with the work. Past experience indicates that not more than 3 per cent of the bonds will have to be renewed. Bonds recently tested have shown a conductivity equivalent to from 3.3 to 4.4 ft. of rail. About 7 ft. is used as a standard on this property. The average weight of all rail on the property is 75 lb. The estimated cost of making this test and performing the repair work necessary over the Wilkes-Barre Railway's entire system is $2,000.

New Standard Type of Safety Car Suggested

Separate Entrance and Exit, Longitudinal Seats at the Ends and Other Changes Recommended to Make the Small One-Man Car Better Adapted to Fairly Heavy Traffic Lines

BY WRAY T. THORN
Equipment Engineer, Chicago, Ill.

THE birth of the safety car was occasioned very largely by the competition of that *bête noir* of the electric railway business, the jitney. In its early application it was thought of more particularly for use in the smaller cities where traffic conditions are not particular severe. However, the economic advantages of these cars in the smaller cities were so quickly demonstrated that there has been a decided tendency to make use of them in larger and larger cities and on increasingly heavy traffic lines. In fact, this increase in the use of the safety car is truly remarkable and forms a well-earned tribute to its originators and to those who in the beginning had the courage to take it up and place it in operation.

In those metropolitan communities in which the safety car has been used, such as Brooklyn, Philadelphia, Baltimore, Boston, etc., it has been installed in most instances on routes not having severe traffic characteristics. The notable exception to this is Kansas City, where the safety cars have been operated through the downtown district, but in this connection recent reports of John A. Beeler have recommended that the cars be arranged so that auxiliary collectors stationed in the downtown district could open the rear door from the outside of the car and permit the egress and ingress of passengers from the rear end as well as at the front.

In order to make the great economic advantages of the safety car available in a broader way to properties operating in large cities it would seem that it might be advisable to have two standard designs of the one-man safety car—the present standard for smaller cities and lighter traffic lines and another standard car built along the same general lines but revised in some respects, as pointed out below, for use in larger cities and on heavier traffic lines. In this discussion no disparagement of the present standard car is intended. Rather, it is desired to give certain suggestions as to designs which it is believed would better adapt these small light-weight cars to the cross-town lines and some main lines of the larger systems. With the proposed second standard available a company would then simply make a choice as to which car would better meet its operating requirements.

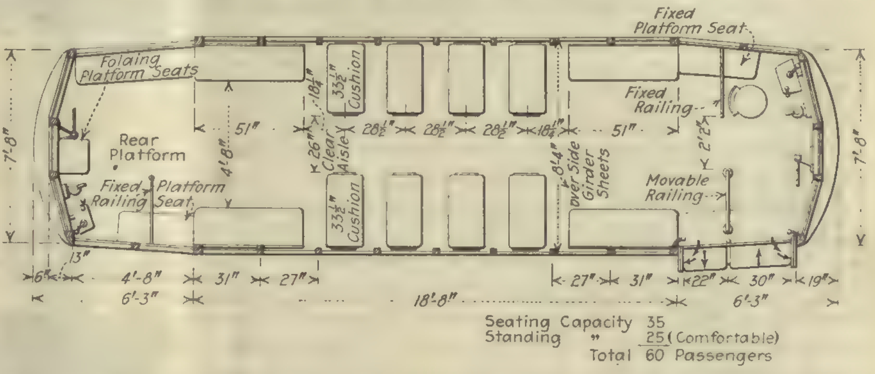
DESIGN FOR HEAVIER TRAFFIC ROUTES

In planning a safety car suitable for installation in large cities, where the equipment in use consists of double-truck cars which have comfortable seats, ample aisle width, low steps and platforms so arranged that passengers can board and alight simultaneously without confusion or delay, great care must be taken that the design of any new car will not be such as to suffer by comparison with the older cars and produce unfavorable reaction because of less comfortable seats, narrow aisles and excessive standing time while loading and unloading. With this thought in mind it is suggested that the following features, as shown in the accompanying floor plan, should be incorporated in the proposed new standard:

1. Car arranged for double-end operation.

2. Width over all to be such as to provide (a) an aisle width of not less than 26 in., (b) a length of cross-seat cushion not less than 33½ in., (c) longitudinal seats at each end of the car body to seat three persons at 17 in. each.

3. Platform arranged with double-door opening, one for entrance and one for exit, with approximately 22 in. clear opening for exit and 30 in. for entrance.



FLOOR PLAN OF PROPOSED ONE-MAN SAFETY CAR FOR LARGE CITY USE

4. Exit and entrance doors to be arranged, if possible, for independent operation so that the operator can close the exit door when all passengers have alighted and confine the ingress of passengers to the entrance door, if this is found necessary to prevent loss of fares. This independent operation of the doors would also minimize the loss of heat in cold weather.

5. Platform railings to be arranged to separate boarding and alighting passengers.

6. Step heights made as low as possible by ramps from the car body to the platform floor, taking into consideration the proper wheel diameter and clearance. By this means step heights of 13 and 12 in. into the car could readily be secured, using 24-in. wheels.

7. Install platform seats in order to give the maximum seating capacity in the space available.

A car designed along these lines would have the following approximate dimensions as compared with the present standard car:

	Proposed car	Present car
Length over body	18 ft. 8 in.	17 ft. 9¼ in.
Length over all	31 ft. 2 in.	27 ft. 9¼ in.
Length of platform	6 ft. 3 in.	5 ft. 0 in.
Width over side girder plates	8 ft. 4 in.	7 ft. 8 in.
Seating capacity	35	30

Such a car would weigh, with careful designing, about 17,000 lb., as compared to the average weight of the present standard car of 14,500 lb.

ADVANTAGES SET FORTH

The proposed car differs from the present standard principally in the provision for the double opening of the platforms, the width over all and the arrangement of longitudinal seats at the ends of the car body.

With respect to the width over all of the car, which is determined by the width of aisle and length of cross-seat cushions, it is very necessary in a car where the movement of passengers is to and from the same platform that an aisle of ample width be provided so that standees will not interfere too seriously with such passenger movement. The desirability of a comfortable length of cross-seat cushion is obvious. The arrangement of longitudinal seats at the ends of the car body, each seating three persons, provides an ample maneuvering space at the point where experience on street, elevated and subway properties has shown it to be very desirable. Such longitudinal seats have already been adopted on the safety cars of the Kansas City (Mo.) Railways.

Platforms of sufficient length to provide for separate entrance and exit passageways are believed to be necessary in order to conserve time at points of comparatively heavy passenger interchange. Such points are rather numerous in large cities, and the double door would provide for the rapid unloading of the car without causing boarding passengers the irritation of having to wait until leaving passengers have alighted, and also thereby provide a distinct saving in the standing time.

The objection will be raised that the double-door platform will allow passengers to sneak in through the exit opening during times of passenger interchange. This point is not believed to be well founded, for the car operator would occupy practically the same relative position with respect to the exit opening as does the conductor on the so-called near-side car. There has been no trouble of this sort reported on the large number of near-side cars operated in three of our large cities.

At such places as baseball parks, amusement parks and large industrial plants, where it is possible to arrange for prepayment areas, the whole platform could be used for loading, or two streams of boarding passengers could be handled, the fares of one queue being collected by the operator and those of the other queue, entering through the exit door, by an operator or special collector.

There is also the possibility, which is worthy of serious study, of operating these safety cars on the pay-leave plan on routes where there are many stops at which large groups of passengers board the cars, thus saving considerable time. Or it is entirely possible that on the average line a combination use of pay-enter during the morning rush, when the loading is scattered and the unloading concentrated in the downtown district, and a pay-leave plan during the evening rush, when the loading is concentrated downtown and the unloading scattered, would prove advantageous.

All of the standard safety equipment now in use on the present type of car could be used without change on the proposed car, except for the alterations in the door-operating mechanism to provide for independent operation of the entrance and exit doors. It is understood that electrical manufacturers have stated that the motors now developed for the safety car will satisfactorily handle equipment weighing up to 17,000 lb. light. The present truck would be suitable for the proposed car, maintaining the present 9-ft. wheelbase and general design, changing only the weight of the springs and perhaps slightly strengthening some of the truck members.

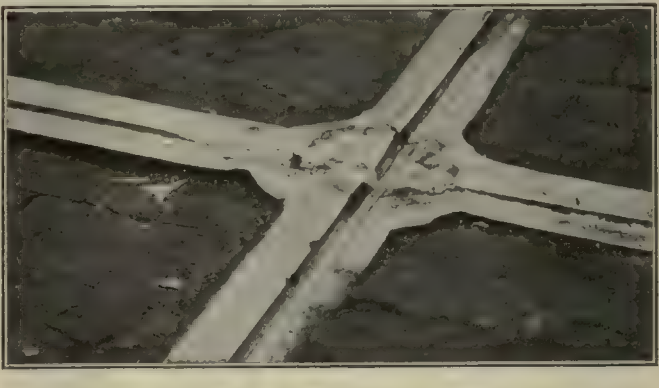
It is hoped that this article will bring out discussion on the car proposed, for it is believed that it would have a wide field of usefulness without encroaching on the field of the present standard car.

Solid Manganese Special Trackwork Repairs

FEW railway track engineers have had much success in building up solid manganese special trackwork with an electric welder. However, C. L. Hawkins, engineer maintenance of way United Railways of St. Louis, Mo., has developed a scheme for renewing the frogs in this type of special trackwork which seems to be working out very satisfactorily.

CAST-STEEL INSERT AND THE TWO WEDGES USED IN REPAIRING BROKEN-DOWN SOLID MANGANESE SPECIAL TRACKWORK

Making use of an acetylene torch, the top of the casting at the frog points is cut out back to the walls of the cylindrical web which supports the frogs. A hollow cast-steel cylindrical block which is flattened on two sides is then inserted in this hole. It is wedged in place by means of two steel wedges shaped to fit the space between the flattened sides of the block and the cylindrical web of the special work. An electric welder is then used to build up the tread and flangeways on the top of this cast-steel insert, the great diversity of crossing angles making it impractical to cast the tread on the insert. A grinder then finishes the job.


A SOLID MANGANESE INTERSECTION REPAIRED WITH CAST-STEEL INSERTS, AFTER SEVERAL MONTHS' SERVICE

An increase of 104.5 per cent in the cost of living of American wage-earners between July, 1914, and July, 1920, is shown in a statement issued Sept. 13 by the National Industrial Conference Board. This figure is based on the board's most recent investigation of changes in the cost of living, a complete report of which will be made public shortly. This increase marks a rise of nearly 19 per cent within the last year and of 5 per cent since March, 1920, the date of the board's last survey of the problem.

New Motor and Trail Cars for St. Louis

Peter Witt Type Motor Cars Have Only Two Steps — Trailers Are Center Entrance and Exit, but Front Half of Car Is Made a Loading Platform

NEW PETER WITT TYPE MOTOR CAR FOR ST. LOUIS, HAVING ONLY TWO STEPS

THE United Railways of St. Louis, Mo., has on order with the St. Louis Car Company for October delivery fifty trail cars which embody a new idea in trailer design. These cars will be designed for one-way operation, with a separate entrance and exit on the side of the car, both of which are ahead of the center of the car body and separated by a 36-in. space providing a convenient location for the conductor between the doors and on the near side of the car. Passengers will enter the forward door, be seated on the longitudinal seats without paying their fare and later leave the car by the exit door and pay their fare as they pass the conductor, or they may enter the forward door and immediately pass the conductor, paying as they pass, and be seated on one of the cross seats to the rear of the conductor's position. This makes an arrangement much the same as that employed in the Peter Witt type motor car, except that the entrance is near the center of the car instead of at the front end.

The advantages advanced for this arrangement of a trailer by M. O'Brien, master mechanic, are that it separates the incoming from the outgoing passengers, provides a very large loading space, induces a single-file entrance of passengers, so that the conductor has better control; minimizes the possibility of losing fares and decreases the standing time required to load. Since the more comfortable cross seats are placed at the rear of the car, passengers are induced to pay their fare immediately upon boarding the car and thereby reduce the amount of attention required from the conductor by alighting passengers. The detailed seating arrangement, door locations, conductor's position and other interior arrangements are clearly shown in the accompanying floor plan of the car.

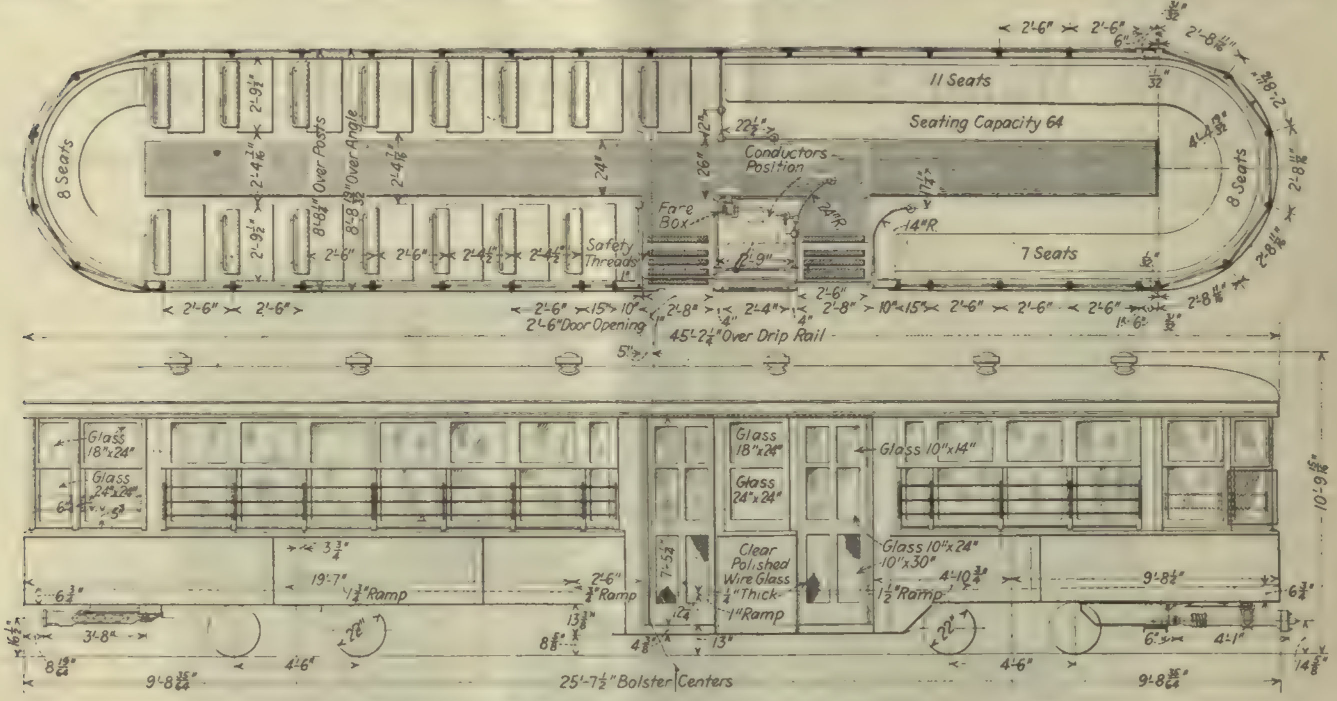
The trailer design used by the United Railways heretofore has been of the double-door, center-entrance type, with a well in the center of the car and the conductor's position on the far side of the car opposite the doors. In these cars there was one step to the floor of the well and another step onto the car floor. With passengers boarding this type of car in double file and passing both ways to seats, it is believed that a number of fares are lost. In the new car there is no well and the two steps of 13 in. and 12¾ in. are both placed at the doors. These step heights have been reduced to these figures by ramping the car floor from the bolsters to the center platform and the platform from the far side to the near side. This ramp from the forward bolster to the platform is 1½ in. in 5 ft., from the rear bolster to the platform 1¾ in. in 22 ft. and for the platform itself 1 in. across the car.

The general construction of the trailer will be steel up to the belt rail, with a wood superstructure and arched roof. It will be mounted on trucks placed at 25-ft. 7½-in. centers, which will be equipped with 22-in. wheels on a 4-ft. 6-in. wheel-base. These trucks are of a special design drawn up by the engineers of the United Railways in conjunction with the Commonwealth Steel Company. Completely equipped, it is expected that these trailers will weigh approximately 25,000 lb. They will seat sixty-four passengers and will be hauled by some of the heavier type motor cars of the company now in service.

One of the features of the car body construction is the stiffening of the superstructure, which is obtained through the use of a steel frame around the doors and a steel post at each of the four corners of the car body.

FIFTY NEW MOTOR CARS TO BE BUILT

The United Railways has ordered the necessary materials and is getting ready to build fifty Peter Witt type motor cars in its own shops. A sample car of this type has already been built in the company's shops and placed in operation. It is pictured herewith. The



FLOOR PLAN AND ELEVATION OF NEW TRAILERS FOR ST. LOUIS

principal feature of the new car is that by cutting down the clearance between the motor trucks and car floor and by ramping the floors it has been possible to build this car without a center well and with only two steps of 15 in. and 12½ in. onto the car floor at center and front, instead of the usual three steps either at the entrance or distributed between the entrance and the steps from well to car floor. The ramp from the front bolster to the center platform was made 4 in. in 6 ft. 9 in., from the rear bolster to the center platform 4 in. in 7 ft. 10 in. and from the aisle to the steps at the center door 1½ in. in 24 in. There are also ramps in the floor and platform at the front end of the car so that the same step heights prevail as at the center. At the front entrance there is a double two-part folding door which folds outward and is air operated and controlled by the motorman. At the side exit there is a double sliding door, also air operated and each half independently controlled by the conductor. The entrance and exit doors have a clear opening of 5 ft., which is divided in the center by an aluminum railing, providing passageway for two streams of passengers either boarding or alighting.

The car body is of all steel construction up to the belt rail, with a wooden superstructure. The equipment of the new motor cars will consist of special designed trucks developed by the Commonwealth Steel Company in co-operation with the railway company engineers and arranged for four inside hung motors. These trucks are of the full-equalized, arch-bar type, the principal feature being that the main frame is made of a single steel casting, which is said to eliminate all the usual connecting bolts and rivets and at the same time to make it impossible for the truck to get out of square. The cars will be equipped with four Westinghouse 508-A, 25-hp. motors and K-35 AA 2 control with a ratchet switch for operating the line switch, and a National Pneumatic Company door-interlock system. A plain magnetic blowout switch is placed in the motorman's cab for use in opening the main power circuit by hand when desired. The overload relay on the line switch takes the place of a circuit breaker and causes the circuit to be broken underneath the car, thus eliminating all noise and flash from the interior.

The new cars will have an over-all length of 50 ft. 6 in. and an extreme width of 8 ft. 10 in. Completely equipped, the weight of the sample car was 36,300 lb., which for a seating capacity of fifty-nine gives a dead load of 615 lb. per seated passenger.

Lubrication of Pneumatic Tools

Some Common-Sense Comments from the Standpoint of the Lubrication Expert of Value to Electric Railway Shop Men

IN ORDER to obtain a full measure of service from pneumatic tools and eliminate the necessity for repairs, it is important that they be handled carefully, be kept clean and be well lubricated with a high-grade lubricant. In the July issue of *Lubrication* some notes on lubricants for pneumatic tools are given which should be of value to electric railway shop men and others. The following points among others are made:

Moisture and some little dust are contained in the air carried into the cylinders of pneumatic tools. Further, the moisture in the air tends to corrode the transmission pipes and storage tanks, with the result that some small particles of rust are carried along by the air. Particles of rubber from the air hose and gaskets may find their way with the other foreign matter into the air passages and cylinders and greatly interfere with the free operation of the tool. Dust, rust or rubber cannot be classed as lubricants and should be kept out of the tool by means of a fine wire strainer inserted in the inlet pipe.

Not all foreign matter which gets into the cylinders and valves of pneumatic tools is carried in with the air. Unless care is exercised a great deal may be fed in with the lubricant. Cases have been known where the lubricant for pneumatic drills was kept in an open can near the drills. A great deal of dust and grit naturally fell into the can, with the result that the drills were being "lubricated" with an abrasive compound.

The lubricant most suitable for any particular pneumatic tool will vary with the type of tool, the nature of the work, the condition of the air and the state of the atmosphere. Generally speaking, the heavier tools require the heaviest lubricants, slow-moving tools requiring a heavier lubricant than those operating at high speed. Heavy lubricants are necessary for use on tools using preheated air or those exposed to high temperatures.

Tools of the trunk-piston and rotary types are commonly lubricated with a light grease, while the high-speed, hammer types, such as riveting hammers, under average conditions of operation are most successfully lubricated with a light oil of about 100-150 seconds viscosity, Saybolt, at 100 deg. F. Tools such as reciprocating drills are provided with grease chambers which are filled by means of a grease gun and from which the grease slowly exudes into the cylinders. One charge of grease if suitable should last several weeks. The gears, crankshaft and pistons of rotary tools all operate in a bath of grease, new applications of which are necessary only after long periods of time. The high-speed tools are lubricated with oil by means of a squirt can. As there is a tendency on the part of the exhausting air to carry a light oil out with it, tools of this kind should receive a few drops of oil every hour or so.

Oils used upon pneumatic tools should have a low cold test, and greases to be successful must be manufactured from low cold-test oils. In addition, pneumatic-tool lubricants should possess enough body to prevent metal contact and friction, but if they are too heavy for the mechanical conditions they tend to impede the action of the tools.

Fundamentals of Substitute Tie Design

THE American Railway Engineering Association has devoted a great amount of time to the study of the subject of substitute ties. In Bulletin No. 227, July, 1920, the association presents the special report of the committee on ties relating to this important subject. Certain conclusions are reached which should be of interest to electric railway engineers. The opinion is expressed that railways should take a more active part in the design and development of substitute ties. This is in line with the editorial which was published in this paper for Aug. 21, which indicated the need for similar procedure on the part of electric railway engineers.

The conclusions of the committee on ties are as follows:

1. No substitute tie has yet been developed which can be recommended for general use on high-speed railroad tracks.
2. The development of substitute ties should be taken up by the railroads with a view of conserving the available timber supply and of producing a track structure of longer life which may be maintained with less labor.
3. Any statements made to urge the introduction of substitute ties on the claim that safe tracks cannot be maintained with wooden ties, such as will be available for some time to come, are without foundation and are contrary to the facts.

This steam railroad point of view will be of interest to electric railway men. The report is exhaustive and is too long for reprinting in these columns. However, Appendix E of the report gives the fundamentals which the committee believes essential in connection with substitute tie design, and this should be of value in connection with designs for tracks in streets and we reprint it in full.

Some Fundamentals Regarding Substitute Tie Design

The tie committee in its investigation of various substitute ties has been impressed with the fact that many of them violate fundamental principles of track construction or maintenance, and it is with a view of pointing out some of those features that this appendix is added to the report.

The experience with substitute ties, so far recorded, indicates the following features as being productive of failure:

(1) Lack of efficient protection against corrosion.

(2) Failure of rail fastenings.

(3) Failure of insulation.

(4) Loss of beam strength due to weakening tie in vicinity of rail to accommodate rail fastening features.

(5) Use of sharp interior angles or square holes, from which cracks are developed.

(6) Lack of protection against derailed wheels.

(7) Design of base of tie such as to render tamping difficult or impossible and such as to make maintenance of proper surface of track impracticable.

(8) Design of the tie such that track will not hold line, or such as to make lining of track impracticable.

(9) Lack of beam strength, causing breakage on yielding roadbed.

(10) Lack of protection from abrasion from ballast in concrete ties.

It is believed that any track supported on ties will not remain permanently to gage, surface and line and that the labor operations necessary to restore it to gage, surface and line will have to be performed with more or less frequency. Therefore, any substitute tie should be designed as far as practicable to

(a) Resist the forces tending to disturb gage, surface and line, and

(b) Lend itself readily to the labor operations necessary to restore the track to its original position.

It is recognized that no tie can completely meet these requirements and that the most that can be expected is a compromise.

Gage.—The fastenings, in addition to being of sufficient strength to resist the stresses produced by traffic, should be of such design that without taking the tie from the track and without change to the holes or fixed bolts or projections in the tie, a reasonable change of width of base of rail or variation of gage may be made. The fastenings should provide a freeway between the base of rail and lip of the fastening.

If the tie is so designed that it is essentially one support under each rail united by a transverse member to hold gage, this transverse piece must be of sufficient strength to maintain gage under all conditions.

Surface.—The tie should have sufficient strength as a beam to support the loads imposed without undue deflection, so that the load may be distributed properly over the tamped bed.

The shape of the base of the tie must be such that it will not cut into or destroy the tamped bed. And, further, it must be possible readily to tamp the ballast under the tie.

Line.—The tie should be of such shape that it will not only resist the tendency of track to get out of line but also permit the track to be thrown back to line.

Ties clamped in pairs or which inclose considerable amounts of ballast between their several parts to such extent that the ballast must be removed before the track is lined would add a material burden to the labor necessary to line track.

Projections on the base of the tie that project into the ballast would make necessary throwing the track out of surface before same can be lined. Such a design would so interfere with lining track as to make it impossible to do satisfactory work.

The end of the tie should be of such shape that the ballast beyond the end would offer resistance to the later movement of the track.

In addition to the above the following features should be provided for:

(c) Insulation or the possibility of insulation without a material change in the tie proper should be provided.

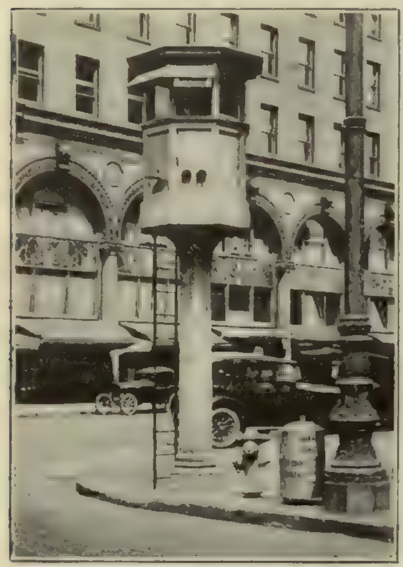
(d) The fastenings should be such as to offer as little obstruction to derailed wheels as possible. They should permit the changing of a defective rail or the renewal of rails with ease, and should be of such character that they can be replaced if broken or defective without disturbing the tie.

(e) The tie should be of such design as to be able to stand a reasonable amount of punishment from derailed cars.

Switchman's Station Supported on Reinforced Concrete Pole

Temporary Wooden Signal Tower on Lines of United Railroads of San Francisco Replaced with Concrete Structure

THE United Railroads of San Francisco has recently completed an installation at Spear and Market Streets by means of which cars approaching the ferry loop are switched from inner to outer tracks from a tower control station on the sidewalk. The crossover between these two tracks was installed when the third loop at the ferry was put in, as described on page 103 of the ELECTRIC RAILWAY JOURNAL for Jan. 11, 1919. The temporary wooden switch control tower which was put in at that time has recently been replaced by the more modern installation shown in the accompanying illustration. Because of the importance of getting cars past this crossover with the absolute minimum of delay, every effort was made to have the switching installation as convenient as possible. The equipment consists of an electrically operated switch of standard type with the remote control push button in a tower. These control circuits are so interconnected with the controls of two signal lights and a target that when the switch is closed the red target turns to a horizontal plane or, after dark, the green light shows. When the switch is thrown to the open position the target is in a vertical plane or the red light shows. Thus green light or flat target is a signal for the motorman on the outer track to proceed at will and for the motorman on the inner track to wait.


SWITCHING TOWER IN SAN FRANCISCO

When the target is in a vertical plane or the red light shows it indicates that the crossover is open to the car from the inner track and that the car on the outer track must wait.

In planning the construction of the tower it was found most economical to use one of the standard reinforced concrete trolley poles made for the Municipal Railways. One was accordingly selected and the concrete was cut off at the desired height, leaving the reinforcing bars projecting for a bond with the top to be cast upon it. As there is a basement under the sidewalk at this point it was necessary to have the concrete trolley pole extend through the pavement and into the concrete floor of the basement.

When the pole had been set in place and the usual cast-iron base placed around it at curb level wooden forms were built up around the top of the pole and the floor for the superstructure or house was cast monolithic. The house has a wood frame with sheet iron panels and is bolted and grouted to the concrete floor. The pair of conduits cast in the original reinforced concrete pole are used for the wiring. In addition to the switch control circuits, the house has electric light and telephone connections. An electric heater is also provided. The ladder which gives access to the house was set about 18 in. away from the post so that a crippled operator could wedge himself between pillar and ladder while changing holds on the ladder. The finish on the concrete work of the tower is a rough surface which was put on by sprinkling on grout with a whiskbroom. This is to prevent defacement, such as writing with chalk and crayon, which would be likely on a smooth finish surface.

The setting of the tower on the curb at the intersection of property lines prevents interference with the traffic in front of or the view from the bank building adjoining. The projection over the windows on the street side is a sheet-iron shield or shade put up to screen the operator's eyes from the sun's rays. The design of the tower is such that it has an attractive appearance and blends with the surroundings. The total cost was about $750. This includes the pole, but does not include the street work, which had already been put in for the temporary wooden tower.

The installation was made under the direction of B. P. Legare, engineer maintenance of way United Railroads, in accordance with designs prepared by the city engineer.

Rail Depends Upon Ingot

Bureau of Standards Finds That Rails Made from Sink-Head Ingots Are in General More Free from Piping

THERE is a constant endeavor toward the betterment of steel rails through improvements in mill practice. Among the details of manufacture the size, shape and method of casting of the ingot have had considerable attention. The United States Bureau of Standards has recently issued a technologic paper by George K. Burgess, entitled "Steel Rails from Sink-Head and Ordinary Rail Ingots," covering a report on tests of several types of ingots and rail steels. The following abstract of this paper should be of interest:

The object of this investigation was to determine the relation of ingot practice to the properties of rails from such ingots, and in particular the amount of total discard necessary to obtain rails free from piping and segregation above 12 per cent which had been rolled from steel made in accordance with varying melting, casting and ingot practices.

To that end thirty-five ingots made by the converter process at Hadfield's, Sheffield, England, and cast by the sink-head process with large end uppermost were shipped to Sparrows Point, Md., and rolled into rails in comparison with fifteen rail ingots made in the ordinary manner with the small end uppermost. Each sink-head ingot, of about 5,300 lb. weight and deoxidized with aluminium in the mold, represented a separate heat of converter steel and all the heats and ingots were made in the same manner. The composition and properties of these ingots were of remarkable uniformity. The comparison ingots, of 7,300 lb. each, were from three separate open-hearth heats, an intentional variation being made in the open hearth and casting practice for each. Five ingots were selected from each of these three heats. Thus, in reality, comparison was made of four different kinds of steel, of very nearly the same composition and physical properties and of two types of ingot form.

The comparison was made by rolling most of the ingots into rails and taking test specimens at each rail cut, as well as from a considerable portion of the upper part, in 5-ft. steps, of the rail bar from each ingot. In this way there was obtained a detailed physical, chemical and metallographic survey of each ingot, and it was possible exactly to delimit the regions of sound and homogeneous from those of unsound and segregated steel. Two complete sink-head ingots were cut longitudinally and examined, as well as representative blooms from both sink-head and ordinary ingots.

The results obtained indicate a decided superiority of the sink-head ingots over the comparison ingots as made of three grades of steel in spite of the fact that the sink-head ingots suffered from the disadvantage of having gone cold before rolling. The Hadfield type of ingot required a total discard of only 18.4 per cent on the average (13 per cent top discard to eliminate piping and segregation above 12 per cent), while the average ingot of the ordinary type for rails required a total discard of 43.9 per cent (26 per cent top discard), with great variations dependent upon the furnace and ingot practices.

The comparison ingots from heat M1-M5 made of nondeoxidized rising steel, chilled on top of ingot by cast-iron caps, required excessive discard to eliminate positive segregation at the top and negative segregation at the bottom of the ingot, the latter often accompanied by dangerous enclosed pipes.

The second heat (M6-M10) made of rising steel deoxidized with aluminum in the molds and the ingot tops of which were cooled with water, required the least total discard of the three heats. It was more subject to piping and less to segregation than the first heat of ingots made in the usual manner.

The third heat (M11-M15), made of quiet or "killed" steel, was not chilled on top with water or caps and was deoxidized with aluminum in the molds. The ingots of this heat required an intermediate amount of total discard when compared to the first and second heats; this heat was the only one for which a greater top discard was required to eliminate piping than to eliminate segregation above 12 per cent. One of the ingots of this third heat contained a small pipe at the bottom and all the rails from the middle and bottom of the ingots showed high negative segregation.

The distribution of physical properties throughout the length of each ingot is characteristic not only of the type of the ingot, as sink-head or ordinary, but also of the state of the steel when cast and the ingot practice.

It has been established in the foregoing that after removal of the top discard of 13 per cent the Hadfield type of sink-head ingot is free from piping and undue segregation. The ordinary type of ingot, cast small end up without sink-head, as is usual for rail ingots, requires an average top discard of 26 per cent, and the remainder of the ingot is liable to contain enclosed piping and excessive segregation. Defective rails, from the middle and bottom portion of the ingot, are not certainly detected by means of existing rail specifications, and as a result of this uncertainty rails containing pipes or excessive segregation may get into service, with disastrous results.

The surface condition of the rails from the sink-head ingots was not as good as for the ordinary ingots, but this is not considered an essential characteristic for rails from such ingots.

The markedly differing characteristics of the three heats of Maryland ingots lead one to raise the question whether or not it might be advisable to specify, at least in some degree, the methods of steel manufacture or of ingot practice for rails and similar products on which the safety of the traveling public depends.

While it is not claimed that the use of the sink-head process for the manufacture of ingots will solve all rail problems, it is maintained that its adoption would be a step in the right direction in view of the present heavy casualties and property losses on American railroads. The necessary changes in mill operations, it is believed, could be made without too great difficulties.

Specifications for Wood Ties

In Specifying the Material the Physical Qualities and Characteristics of the Wood Must Be Considered

BY HOWARD H. GEORGE
Assistant Engineer Public Service Railway of New Jersey

THE difficulty of securing satisfactory timber for ties has increased greatly during the last few years. Costs have increased from about 75 cents per tie to approximately $1.50, and in some cases as high as $1.75 each f.o.b. point of shipment. This scarcity and high price has been an incentive for trying many experiments with steel, concrete and composite ties, but the great majority of railways still favor wood for ties. In view of the diversity of practice in connection with ties other than wood and of their, as yet, relatively limited use, no attempt will be made here to give detailed specifications for such ties.

Of course, the problem, as regards the kind of timber to be used, is largely controlled by local considerations. The specifications appended were intended to cover the conditions which govern for our own territory in so far as the kinds of timber are concerned. Other companies will undoubtedly find it necessary to include other timber in their specifications, which may be easily purchased locally or which is within easy shipping distance of the property. It is generally conceded that the following woods may satisfactorily be used untreated for ties: White oak family, long-leaf strict heart yellow pine, red cypress, red wood, white cedar, chestnut, catalpa and locust, except honey locust. In addition the following timber will make satisfactory ties when treated: red oak family, beech, birch, elm, maple, gum, douglass fir, spruce, hemlock, tamarack, yellow and white cypress, and all pines except long-leaf strict heart yellow pine. In the attached specifications the sound and square-edged long and short leaf yellow pine ties are generally purchased for treatment and are rarely used untreated.

In determining problems of this character it is well to keep in mind the physical qualities and characteristics of the wood under consideration. Red oak, for example, is a porous wood which is generally full of water and which, if exposed to seasoning influences, has a tendency to dry with great rapidity in a more or less uneven manner, which is apt to result in checks and splits. Checks in this wood are largely end checks and there is a tendency for section men to drive spikes into small checks, thereby increasing the split. This peculiarity is also common to beech and gum.

Cross Ties

Quality:

All ties to be cut within ten months from the time of delivery from sound, straight, live and thrifty timber, free from loose or rotten knots, dry rot, splits, wind shakes or any other imperfection affecting the strength or durability of the timber.

Dimensions:

6 in. thick, 8 in. width of face and 8 ft. long. A variation from above specifications will be allowed as follows:

	Hewn	Pole	Sawed
Depth not less than.	6 in.	6 in.	6 in.
Depth not more than	7 in.	7 in.	7 in.
Face not less than...	7½ in.	6 in.	8 in.
Length............	8 ft. to 8 ft. 2 in.	8 ft. to 8 ft. 2 in.	8 ft. 0 in.

Ties which do not conform in size to the above or have any other defects will be classed as cull ties and will not be accepted.

White Oak and Rock Oak:

Hewn ties must be stripped of bark, hewn smooth and clean of all splinters, deep score marks, straight, with faces true and parallel and of uniform thickness with ends sawed off square. Ties hewn from one-half or one-quarter logs, or sawed from large timber will not be accepted. No off oaks will be accepted.

Mixed Oak and Chestnut:

Hewn ties must be stripped of all bark, hewn smooth and clean of all splinters, deep score marks, straight with faces true and parallel and of uniform thickness and ends saw butted. Ties hewn from one-half or one-quarter logs or sawed from large timber will not be accepted.

Yellow Pine Heart Ties:

Ties must be of good, sound Southern long leaf yellow pine and must be hewn smooth on all sides with faces parallel and of uniform thickness with ends sawed off square. Ties must be free from defects such as injurious heart or wind shakes, red heart, rot, worm holes, loose or unsound knots, or other defects that will impair the strength and durability of the ties.

Ties must be hewn so that the heart will be at or near the center of the tie and must not have over one inch of sap on each corner, which means the tie must show 6 in. clear heart on the 8-in. face and 4 in. of clear heart on the 6-in. side.

No short leaf pine will be accepted.

Sound and square edge long leaf yellow pine: Ties must be of good Southern long leaf yellow pine, or, in other words, must have the same qualities and must pass the same inspection as the heart pine regardless of the sap.

Sound and Square Edge Yellow Pine:

Ties must be of good Southern yellow pine, and must pass the same inspection as the sound and square edge long leaf yellow pine except that all kinds of Southern pines will be accepted.

Cypress:

Hewn ties must be of good red cypress, free from wane, rot, dote, honeycomb or other defects, to show one heart face, allowance 1-in. sap on two opposite corners.

Ties must be hewn smooth on all sides with faces parallel and of uniform thickness and saw butted at both ends.

No white cypress will be accepted.

Inspection:

All ties shall be subject to the inspection of an agent of the Maintenance of Way Department at the point of shipment as ties are being loaded into cars or vessels. Any ties shipped for point of destination inspection, without our consent, will be rejected and be subject to owner's risk.

It is very desirable that a definite permissible variation be adhered to in the general dimensions of the ties. This is particularly true in the case of city track, where a trench of limited width is provided, and where excess length means greater disturbance of the adjacent paving. It is also very important that the width of the tie at the bearing point be maintained up to a certain standard in order to prevent premature failure of the tie due to crushing.

The cost of inspection, of course, varies widely. Under favorable conditions, it may not run over 2 cents per tie, while it may approximate 25 cents. The latter cost is, however, exceptional and excessive, and no order should be placed where a dealer is not in a position to furnish a sufficient number of satisfactory ties at one location to eliminate the possibility of such an expense being incurred. The writer has in mind one instance where, out of a total of about 6,000 ties offered, only about 900 were accepted by the inspector, the period of inspection covering about ten days. However, one experience of this kind should be sufficient to bar such a dealer from doing any further business with a railway company. When ties are running as they should and the dealer is honestly endeavoring to comply with the specifications and is not trying to palm off a lot of defective ties, a competent inspector should be able to pass a carload of approximately 500 ties per day in the hardwood districts. In the case of pine ties, where shipment is being made by boat, it may be possible, under very favorable conditions, to accept as many as 8,000 ties per week, but this is the exception rather than the rule and 4,000 ties would be considered a good week's work for one inspector. It is generally desirable that tie inspection be made by the railway company's own inspector at the point of shipment, as this eliminates the possibility of disputes which almost invariably arise where inspection is made at destination. The cost of handling is largely increased due to having to handle a lot of ties which are not up to the requirements of the specifications.

Glass Headlight Reflectors

A SATISFACTORY headlight is an important aid to railway operation and a recent report of the Electric Service Supplies Company gives some useful information about glass headlight reflectors. The ground and unground glass reflectors are compared on a basis of efficiency, cost, space saving, durability and optical qualities. In comparing cost and diameter for the two types the figures show that the cost increases rapidly for each type as the diameter increases and that the unground reflectors cost approximately one-third less than the ground reflectors. On comparing the reflectors on a beam candle-power basis the curves indicate that the beam candle-power increases only approximately as the square of the reflector diameter and that the ground and polished reflector averages about 50 per cent higher in beam candle-power than the unground for the same diameter of reflector, while on a cost per candle-power basis the curves indicate a much lower cost for the ground and polished reflector as compared with the use of the unground reflector.

These data lead to the conclusion that on the same candle-power basis the unground reflectors must have a larger diameter and a greater cost than the ground reflectors.

The diameter of the headlight reflector is an important factor in determining the cost and type of headlight case. The use of a strong and water-tight case is advocated in order to insure reliability and decrease maintenance.

AN EXTENSION TO THE NEW BRACKET TAKES THE PLACE OF OUTSIDE POLES ON CURVES

A Neat Trolley Bracket

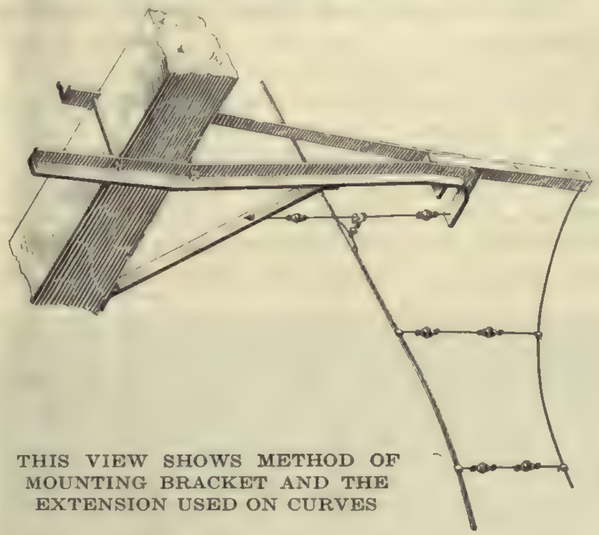
Extension to Specially Designed Angle-Iron Bracket Used in San Francisco to Take Place of Extra Poles

THE city of San Francisco, through the agency of its engineering department, has developed and adopted a particularly attractive and practical design of trolley bracket arm for use on ornamental concrete poles. Aside from its use upon tangent track as a very effective and economical support for the trolley wire, it is adapted for use upon curves as well, thereby eliminating the extra poles usually set upon the outside of the curve to support "pull-off" wires.

Concrete poles of square cross-section with graceful tapers and pyramid tops are provided, when poured, with transverse slots at the proper height for the support of a double angle-iron bracket. This bracket is mounted rigidly in the slot in the pole by means of two bolts passing through both angles just outside the pole, as indicated in the accompanying drawing. A 45-deg. brace of similar cross-section extends from the bracket down to the pole. The outer end of the bracket is tapered to a point and bent downward in a quarter-bend of about 8-in. radius. This forms the outer support for the strain insulators and short span-wire holding the trolley wire. The inner end of the span-wire is connected, with the proper insulation, to the brace.

USE OF ANGLE-IRON TROLLEY-WIRE BRACKET IN SAN FRANCISCO UPON TANGENT TRACK

When used upon curves an extension is bolted to the angle-iron bracket. This extension is sufficiently long to support the necessary bridle span-wire for the trolley "pull-offs" required by the curve. The construction is clearly shown in the accompanying plan view drawing.



THIS VIEW SHOWS METHOD OF MOUNTING BRACKET AND THE EXTENSION USED ON CURVES

Two photographs, reproduced herewith, illustrate very well the use of this new double-bracket construction upon both curves and tangent track.

Stopping Rust Formation

AN OIL for use on metallic surfaces which have already become rusted or for use on new surfaces as a preventive for rust is being placed on the market by the American Chemicals & Manufacturing Company, New York. It is claimed that this oil has such an affinity for steel that it practically welds itself to the steel whether it has a smooth or rough surface. It penetrates through the rust to the clean base metal and stops further corrosion. By chemical action it causes the rust to unite with the oil, forming a non-porous elastic film, which toughens with age and remains flexible. Its flexibility will meet the expansion and contraction of metals to the extent of bending over a radius smaller than the diameter of the thickness of the metal to which it is applied. This oil is sold under the trade name of "Hippo" permanent, pliable oil, and other claims made for its use are that it will withstand the destructive influences of acids, alkali and gases and that it is entirely waterproof. It is a good insulator.

In the current issue of *National Safety News* a form of stop sign is described which is located at the door opening of center-entrance cars. This sign and its method of operation were developed by J. F. McInerney, master mechanic New York State Railways, Syracuse. This railway is a member of the National Safety Council. The sign has a white background and in black letters is the word "Stop." When the car is in motion the sign lies flat against the door. As soon as the car stops and the doors are open the sign is released and swings out by the action of a small spring to a position at right angles to the side of the car. Automobilists who are following are thus warned that the car has stopped and is about to receive or discharge passengers and reminded that the traffic ordinance forbids them to pass a car at such a time.

Thickening Wheel Flanges by Welding

This Process Was Promising When Introduced, but Metallurgical Experts Advised Caution—What Results Have Been Obtained Since?

SOMEWHAT more than five years ago an article on restoring steel wheel flanges with a welder by F. A. Murphy, Ottawa, Ill., was published. (See ELECTRIC RAILWAY JOURNAL, April 10, 1915, page 719.) He had found the practice economical, although it was confessedly experimental. He invited comment, and in response Morgan D. Hayes, Midvale Steel Company, Philadelphia, Pa., gave valuable information as to the metallurgy of the matter. Mr. Hayes advised caution on account of the complications in the structure of the steel caused by the unequal distribution of heat in the welding process.

WORN FLANGES BEING THICKENED BY ARC WELDING

Commenting at the time upon the then new application of the welding art, this paper said editorially:

> There are, it seems to us, three questions to be answered: First, if wheel flanges and treads can be built up without serious injury to the structure of the metal, would such building up be profitable? Assuming an affirmative answer for the sake of argument, then, in the second place, is it possible to build up worn or broken sections without the formation of hard and soft zones? Finally, assuming a negative answer for the same reason, is such stratification a dangerous condition under some conditions of railway service, and if so, under what conditions?

During the period which has elapsed since the above discussion the electric railways have passed through the war period, with its difficult maintenance problems. The practice of building up thin tires has been found very useful, as was illustrated by the experience of the Western Ohio Railway, described in the paper by E. B. Gunn at the July meeting of the Central Electric Railway Association. (See ELECTRIC RAILWAY JOURNAL, July 17, page 127.) This paper brought out much valuable discussion. At the meeting of steam railroad master mechanics, held at Atlantic City in June, the discussion also favored the practice.

The plan is followed in the shops of the Spokane & Eastern Railway & Power Company, Spokane, Wash., with good results. The photograph reproduced herewith was taken recently by the writer when inspecting these shops under the guidance of M. G. Charles, master mechanic. The job is an excellent one from the welding standpoint.

It appears to be a good time to bring together the experience of other roads in this matter. The ELECTRIC RAILWAY JOURNAL would be pleased to hear from them.

Co-operation Between Shop and Train Men

INTEREST of the trainmen, co-operation of all departments and competent instruction are essential to success in high coasting records. The benefits, however, fully justify the effort put forth, as shown by the experience of one company recently. This company feels confident that more than 95 per cent of its motormen are sincerely trying to run their cars correctly. The evidence of this is the fact that this percentage of the cars are operated with a record of more than 30 per cent coasting. As the vice-president of this company says, "No man who is not really trying can possibly make such a record." The benefits of coasting are not alone in operation, for the maintenance work is greatly facilitated by accurate reports of motor, brake and other equipment conditions. A motorman who turns in a car with tight brakes will complain bitterly if his report of this condition does not receive immediate attention when he knows that failure to correct the difficulty means that his coasting record is spoiled. Light wear on brakes and wheels and all-around improvement in equipment condition follow from the co-operation between shop and train men.

The saving of current in coasting is, of course, the principal direct object of the effort. The experience of this above company indicates that this saving continues to be proportional even when coasting reaches high average percentages. A very material reduction in power costs is, therefore, possible when the best operating results are had.

Joint Conference Committee Issues Bulletin

THE joint conference committee of the four founder societies, the ad interim executive body of the Federated American Engineering Societies, has issued under date of Aug. 20 its Bulletin No. 6, giving answer to several pertinent questions which have been asked and also telling of the recent action of the American Society of Civil Engineers in annual convention, when the board of direction was directed to conduct immediately a referendum vote on the question of the society's becoming a charter member of the new organization and to act immediately in case the referendum receives a favorable vote.

In answer to questions, the bulletin explains why the "proposed federation" should supplant Engineering Council if the latter is either a failure or a success; it tells what class of engineering organizations were invited to become members and states that the list it now has is not considered complete and that organizations eligible for membership, whether they have received formal invitations or not, may make application, and it explains how members of the executive board are elected to give fair representation.

Copies of this bulletin and other information regarding the Federated American Engineering Societies may be obtained from the committee, Engineering Societies Building, 29 West Thirty-ninth Street, New York.

Federal Report Brings More Comment

Two Additional Statements, One Already Given Much Publicity in the Daily Press, Emphasize Some of the Features of the Report

TWO more statements, reflections of the report of the Federal Electric Railways Commission, are given below. Mr. Pardee's statement was released to the daily press the early part of this week and was widely printed. Mr. Mortimer calls the report a "masterly report" and suggests periodic repetitions of similar commission studies of the industry.

John H. Pardee

President American Electric Railway Association

Credit, vitally needed by electric railways throughout the United States, can best be restored by regulatory bodies making the rates of returns to lines more flexible. I strongly indorse the declaration of the Federal Electric Railways Commission, in its report to President Wilson, that "the first essential to the industry is to restore credit."

In the electric railway industry, as in every other business, economic law dictates that the price of the product must be based upon the cost of producing it. In the attempt to regulate the profits and the service of electric railways, this truth has been lost sight of and the operation of these carriers has been so hedged about with laws, ordinances, regulations and contract restrictions, that in the main their revenue has been controlled by the dictum of commissions and other regulatory authorities, while their expenses have been controlled by economic law alone, and have mounted as expenses in all other business and among private individuals have mounted.

To restore electric railway credit it is essential that these artificial methods of fixing electric railway prices should be done away with. As the commission well states, "public control must be flexible enough to enable them to secure sufficient revenues to pay the entire cost of the service rendered, including the necessary cost of both capital and labor."

The report of the Federal Electric Railways Commission strongly emphasizes its finding that the systems of electric railway transportation are permanent, essential to, and must be preserved for, the social and economic functioning of our cities and communities.

A very acute situation exists among the electric railways at the present time. The abnormal increase in urban population, which has marked the development of the country during the last thirty years, continues, as is evidenced by the latest census returns. The problem of caring for these new millions of city dwellers is not alone one of providing dwellings, it is equally a problem of providing local transportation facilities.

The industry needs immediately for such extensions and betterments and for the rehabilitation of existing properties which have deteriorated during the war between $300,000,000 and $400,000,000 of new capital and it will need for years to come an average of more than $200,000,000 a year, exclusive of its refunding obligations. Today, the investor looks askance at electric railway securities, and it is practically impossible for these companies to dispose of either their stocks or bonds.

Under such circumstances, it is no wonder that the commission declared that the "first essential is to restore credit." No impartial investigator can come to any other conclusion, and it cannot too forcibly be brought home to the American public, that unless the confidence of the investor be regained, the electric railways of this country, which represent an outlay of more than five billions of dollars, will cease properly to function and will prove of little avail in the solution of the housing and transportation problem which confronts almost every community in the entire United States.

Ordinary business common sense dictates the way in which this must be accomplished. The credit of the industry was destroyed because its revenues were insufficient to provide a return satisfactory to the investor and at the same time provide surety that this return should be continuously forthcoming.

The social service performed by these utilities is their most important function and the public interest demands that no undue obstacles should be put in the way of the performance of their full public duty. They perform an essential public service, which as the commission points out can be performed by no other means of transportation now in existence. They should not be weakened in their ability to serve the public by the competition of jitneys or city buses which cannot approach the complete service rendered by electric railways; they should not be compelled to bear an undue burden of taxation and public charges and they should be given freedom to put into operation every practicable operating economy that is in the public interest. Only in this way are low fares possible, and the lowest fare compatible with the payment of full cost of service, including a return that will attract the necessary new capital, is in the interest of both the public and the companies.

The report of the commission should awaken the public to the necessity of restoring electric railway credit, and if so, the commission will have accomplished a great work in the public interest.

The report deserves wide publicity and close study by all having real interest in the affairs of their respective communities.

J. D. Mortimer

New York, N. Y.

In many respects the July 28, 1920, report of the Federal Electric Railways Commission is a masterly document. It discusses the most important questions having to do with the electric railway industry and arrives at general conclusions. The similar characteristics of these problems, as they are met throughout the country, show that we have to do with a national problem; the symptoms may differ, but the general remedy is the same. All the railways require new capital. New capital cannot be obtained without credit. Credit cannot exist without adequate net earnings. Adequate net earnings cannot exist unless the operating revenues show a stable difference over operating expenses in sufficient amount to permit the issue of securities that will be absorbed by the investing public in sufficiently large amounts. All the other things are details fastened on the main trunk.

The unanimity of the report is striking. Many questions of a controversial nature were dealt with. It required important concessions in expressed opinions on the part of individual members to arrive at unanimous conclusions. Here is one of the principal elements of the value of the report. If the commission had split up into little groups, each with an impending separate report, much of the work done before and by the commission would have been lost.

At first study one is inclined to regret that the commission found it advisable to soft pedal the political problems met in dealing with the railway industry. Spades are spades but public co-operation may be the same as the elimination of politics in a public service. But, considering the results to be accomplished, the commission wisely avoided direct reference to problems raised or accentuated by the public office seeker.

It is no doubt true that in the final analysis "Fair

Valuation" of the utility property will play a prominent part in any readjustment of contractual relations between utility corporation and municipality. It is already one of the two big factors in states where the regulating commissions have power over fares. The federal commission follows up this idea by inviting the electric railway corporations to reduce capitalization to the respective "fair values" of physical property where differences of that nature exist. Probably the commission is right in its recommendation. Probably the readjustment would be advantageous in the long run. Probably railway utility corporations would find it easier to attract new capital. Probably the differences between "fair value" and capitalization, where they exist, have an important influence on credit. But we need a new breed of men to have any reasonable expectation that the electric railway industry will voluntarily destroy whatever investments have been honestly made in the securities which would suffer the most by such a reorganization. Forced reorganization is another thing; there the proper relationship of fair value and capitalization should be recognized.

From the personal point of view I regret that the federal commission could not see its way clear to say something more complimentary toward public ownership of electric railways. Those who heard the testimony on the subject were not impressed with the logic of the public ownership advocates. The best argument was that of Bauer, who favored free street railway service. The "mathematician" from St. Louis hurt the idea by this excessive enthusiasm. The commission probably passed on this question of public ownership with its eye on the pocket of the public. The commission would later be subjected to criticism if it favored public ownership in its report and it worked out to be advantageous to the railway corporations, rather than the public.

Without any suggestion of attempted compromise in viewpoint leading to inconsistency, the report supports the views of practically all the schools of operators and publicists. Any one can find portions of the report that will support his theories. But the report as a whole is consistent. If the business were re-established on the basis recommended, it would be in better condition than is now the case. Many operators probably feel that the same commission, were it to report a few years later, would lay greater stress on certain matters not touched on or only incidentally referred to in this report. The success attained by the first Federal Electric Railways Commission suggests that the idea is meritorious and investigations and reports at five-year intervals might do much to re-establish the electric railway business as a necessary industry and give it an improved position in the investment markets of the world.

Association News

ATLANTIC CITY CONVENTION, OCT. 11 TO 15

Up-to-the-Minute Convention Notes

A DISCUSSION of the report of the Federal Electric Railways Commission will be given a prominent place on the American Association program at the Atlantic City convention. Arrangements are being made with men prominently identified with the federal inquiry to lead in this discussion.

* * *

The committee having in charge the transportation of the Western delegates to the convention has sent out a circular calling attention to the necessity of securing 125 passengers to insure the provision of a special train. Otherwise special sleeping cars will be attached to regular trains. The special schedule is as follows: Leave Chicago, Oct. 9, 5.30 p.m.; leave Ft. Wayne, Oct. 9, 9.08 p.m.; leave Pittsburgh, Oct. 10, 7 a.m..; leave Harrisburg, Oct. 10, 12.55 p.m.; arrive Atlantic City, Oct. 10, 5.40 p.m. Reservations can be made by application to the chairman, H. J. Kenfield, or to any of the sub-chairmen, as listed in the issue of the ELECTRIC RAILWAY JOURNAL for Aug. 21, page 375.

* * *

The list of convention exhibitors continues to grow, the following names having been added since the publication of lists in the issues of this paper for Aug. 21, page 376, and Sept. 4, page 469: Rowe Motor Manufacturing Company, Packard Motor Car Company, the White Company, V. V. Fittings Company, Standard Coin Counter, Inc., C. I. Earll and Foamite Fire Foam Company.

Committee on Safety Car Operation

THE T. & T. Association committee on safety car operation met in New York on Sept. 8. In the absence of the chairman, C. W. Kellogg, New York City, E. M. Walker, Terre Haute, Ind., presided. There were present also C. H. Beck, New York City; W. H. Burke, Boston, Mass. (representing Mr. Kellogg); L. H. Palmer, Baltimore, Md. (sponsor); J. C. Thirlwall, Schenectady, N. Y.; Gardner F. Wells, New York City, and J. W. Welsh, of the association staff. The committee considered a preliminary draft of a report prepared by the chairman and the results of a questionnaire as tabulated by the association staff. The situation regarding safety car operation was discussed by the committee in detail.

Reunion of Past-Presidents of Accountants' Association

PLANS are under way for a reunion meeting and dinner at the time of the Atlantic City convention of past-presidents of the American Electric Railway Accountants' Association and of its predecessor the Street Railway Accountants' Association of America. The idea was originally suggested in a letter published in the issue of this paper for June 26, 1920, by Walter B. Brockway, former president of the Accountants' Association and for many years its secretary, and the matter is now in charge of a committee consisting of three past presidents, the present president and the secretary. The dinner will be held on the evening of Tuesday, Oct. 12, unless some change is made in the program as now arranged.

Company Section Committee Meets

M. H. SOMMERVILLE, Toledo, Ohio, chairman of the American Association committee on company sections, met with C. H. Jones, Chicago Elevated Railways, and Messrs. Burritt and Welsh of the association staff, on Sept. 2, to put the finishing touches upon the report of the committee for the current year.

Safety Car Accident Data

In the communication from E. M. Walker, printed in the issue of the paper for Sept. 11, page 509, a typographical error occurs in the accident data table, third line from bottom. The figures should read "per 1,000 car-miles," and on this basis are as follows: $8.38 for the safety cars and $15.78 for the two-man cars.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Council Postpones Action

Toledo Railway Measures Before Council Again on Sept. 27—Bus Interests Busy

The Council of Toledo, Ohio, postponed action upon the cost-of-service and twin municipal ownership propositions when it met on Sept. 13. The measures will be passed again for submission to the electorate at the November election when Council meets on Sept. 27 if present plans and a gentlemen's agreement are carried out.

Bus Measure Presented

At the meeting of the Council, however, two propositions came up which may have a bearing upon the solution of the question and the final vote of the people. One is a measure authorizing the issuance of $845,000 of deficiency bonds. The other is a bus regulation ordinance.

The deficiency bond issue discloses a system of city finance that may throw additional light upon the wisdom of refraining from purchase of the street railway system, or rather, the issuance of $7,000,000 for an indefinite "transportation system."

The municipal ownership enthusiasts used as their argument the fact that the city was a corporation larger than the railway and better able to finance itself, when they urged the passage of the bond issues at the primary election.

At the present time the city has a deficit for last year of nearly $350,000 in operating expenses alone. This same amount has been accumulating three years and the deficit will be enhanced this year because of increased salaries for practically all city employees.

On account of tax limitations revenue does not increase and there is also a limitation placed upon the amount of bonded indebtedness which the city can assume. If the deficiency bond issues become a regular annual procedure then in the event of a municipal ownership of the railway system it would only be a few years till no further financing could be secured through bond issues.

Campaign Slow in Starting

Councilman Bitter, socialist, submitted to the Council on Monday evening an ordinance prepared by Leo Griswold and other bus owners for the regulation of motor buses. It was referred to the railroad committee. The ordinance provides for the licensing of bus owners and drivers and requires the posting of a $10,000 bond with the Council for indemnity in case of accidents. Maximum fare to be charged is placed at 10 cents.

It is thought that the regulatory measure is a move on the part of the bus owners to protect their business against any regulations which might be asked on the part of the traction interests if either the city regulation or city ownership ordinances passes or by the Toledo Railways & Light Company in case the measures just mentioned should fail.

Neither of the interested parties in the coming election has begun any definite campaign.

Help in Housing

Home Building Fund of $150,000 Created by Los Angeles Railway for Its Employees

An extensive plan for improving the housing conditions of the employees of the Los Angeles (Cal.) Railway was announced by G. J. Kuhrts, general manager, on Sept. 6. The railway plans to create a home building fund of $150,000 for the use of employees in purchasing or building houses.

Housing conditions in Los Angeles have been a considerable problem for some time and the shortage of homes near the five division points and the main shops has assumed serious proportions.

$150,000 Rotating Fund

Although details of the plan have not been completed, it is proposed that employees will be loaned money from the $150,000 fund at a minimum rate of interest and allowed to repay the railway in small monthly installments deducted from the pay check. This is expected to relieve the burden that would be occasioned by a loan from an outside source requiring large payments.

Another tentative plan of the company is the building of bungalow courts near the division points and placing the homes at the disposal of employees only, at a moderate rent.

The fund will be revolving so that as one employee repays his loan the money becomes available for other employees to establish homes. Applications will be considered in the order they are made to the company and the amount to be advanced will be determined on the merits and needs of the individual case. To prevent employees commercializing the offer, it is proposed that no loan shall be made to an employee who already has a home and who might use the fund for building another house or houses to rent.

Complete details of the plan will be announced later by Mr. Kuhrts.

New Franchise Planned

Dallas Railway Will Seek Real Service-at-Cost Grant at Spring Election —Financing Impossible Now

Richard Meriwether, vice-president and general manager of the Dallas (Tex.) Railway, has announced that his company will seek a strictly service-at-cost franchise from the city of Dallas at the municipal elections to be held in April, 1921. The new franchise will be asked with a view to completion of an "ultimate development plan," which will include a number of extensions, improvements and betterments.

Present Franchise Unsatisfactory

The Dallas Railway has been operating under a franchise embodying some of the service-at-cost features since its new grant at the election in April, 1917. The present franchise, however, does not guarantee a fixed return, but provides that whenever the earnings of the company shall exceed 7 per cent on the agreed valuation, the fare shall be automatically reduced. The company has never earned 7 per cent under this franchise, but there has been a steadily accumulating deficit.

Under the terms of the 1917 franchise, the company is to make certain improvements, all looking to an "ultimate development plan," which calls for the construction of several crosstown lines that will eliminate much wasted mileage as compared with the present system and at the same time relieve congestion on downtown streets.

Although the fare was fixed under the 1917 grant at 5 cents, the City Commission recently granted a 6-cent fare. This was done when the company represented that the 5-cent fare was confiscatory. Mr. Meriwether said that the company's gross operating revenue had increased 8 per cent during the five months the 6-cent fare had been in effect as compared with the same five months of last year. During this time, however, increased operating expenses had more than offset the increased revenue. Mr. Meriwether said the company was unable to borrow money for improvements under the present franchise.

Valuation Already Made

Under the present franchise the city has the exact value of the railroad property, all expenditures for improvements having to be approved by the Board of City Commissioners before they can be made. The new franchise will also embody the benefit assessment plan. This would place the burden of extension on the property owners that benefit directly rather than on the general public.

$1,400,000 Additional for Bay State Men

Eleven Cents an Hour More Awarded in Arbitration Under Way Since Last Spring—Company's Arbitrator Dissents

An increase of 21½ per cent in the wages of the trainmen of the Eastern Massachusetts Street Railway, Boston, or a jump to each of the 4,000 employees of 11 cents an hour, was announced on Sept. 11 in a majority decision handed down by the board of arbitrators between the company and the Amalgamated Association. The men asked for a flat rate of 75 cents an hour, an increase of 24 cents. The award means an increase in pay from 51 cents an hour to 62 cents. The decision is retroactive to May 1. It means that the company will have to make up back pay of $500,000. The annual payroll is increased $1,400,000 by the award. At meetings of the men Saturday night the award was accepted. The award is effective only until May 1, 1921.

WITHIN a very short time, the company proposes to declare a new schedule of rates on all its lines. In connection with this it is also announced that all workingmen's tickets are to be called in and all free transfers to be abolished. It seemed doubtful on Sept. 13 whether any increase would be made in the flat 10-cent fare now in force on the company's lines. The burden of any advance appeared at that time more likely to hit the steady customers of the road or users of the reduced rate punch tickets.

TRYING TIMES AHEAD

The seriousness of the situation was emphasized by the trustees of the company on Sept. 12 in a statement as follows:

> Of the $1,400,000 additional which the company must pay its employees annually the car riders in the principal districts will be called upon to share approximately as follows: Lynn, $180,000; Salem, $140,000; Brockton $190,000; Chelsea $160,000; Lowell $170,000; Lawrence $120,000; Haverhill $65,000; Quincy $115,000; Taunton $40,000; Fall River $125,000; Melrose-Woburn $90,000; Norwood $20,000.
>
> Two courses are now open to us in our efforts to obtain the money to pay this 21½ per cent increase.
>
> One course is substantially to increase fares; the other is greatly to reduce service.
>
> Thoroughly convinced as we have been since our appointment by the Governor to rehabilitate this railway that what the public wants and needs more than enything else is good service, we have concluded to increase fares.

The revenue of the company from fares was so divided that until the award 60.58 per cent of the whole went toward paying wages of the trainmen. As a result of the award the company will now be compelled to pay in wages 71 per cent of its total revenue from fares. The trustees maintain the company has virtually no other sources of income.

FIVE CENTS EXTRA FOR ONE-MAN OPERATORS

Special provision has been made for the operators of one-man cars. There are some 200 of these on the lines of the company. They have been awarded an extra 5 cents an hour over the pay of the regular motormen and conductors. It was the problem as to what larger pay should be awarded to operators of one-man cars that began the arbitration proceedings back in December, 1919, the problem concerning a general wage increase to all the employees of the road being drawn into the proceedings as events developed.

The board of arbitration was composed of Philip G. Carleton, Cambridge, for the company; James H. Vahey, Watertown, for the workers; and Hugh W. Ogden, Brookline, the neutral arbitrator.

Under the award the employees of the company receive 8 cents less in pay per hour than the employees of the Boston Elevated Railway.

Mr. Ogden and Mr. Vahey concurred in the finding. Mr. Carleton dissented.

The points at issue resolved themselves into three main division:

> 1. What, if any, increase in wages shall be awarded to the employees whose wage scale is now under consideration?
> 2. What shall be the rate of compensation for employees operating one-man cars?
> 3. What, if any, change in hours of labor shall be inaugurated?

Hearings began June 29 and proceeded until Aug. 9, when briefs were filed. Two thousand pages of testimony and 115 exhibits were submitted to the board. One of the points brought out was that a total of 150.82 miles of track has been discontinued within the last three years, leaving a total of about 750 miles of track now in operation. The capitalization of the company was fixed by the act of the Legislature at not to exceed $40,282,340, plus certain amounts to be approved by the Public Service Commission, which fixation of capital was based upon an investigation and finding of the Public Service Commission of Massachusetts.

BASIS OF MEN'S CLAIM

The men based their claim to an increased wage at this time upon two propositions:

> 1. The increase in the cost of living during the last six years has more than kept pace with their increased wage, and therefore they are today relatively worse off than they were in 1914.
> 2. Other systems geographically near, upon which the work done is substantially the same, pay a very much higher rate of compensation.

They contended that upon both of these grounds the men should receive at least 66⅔ cents an hour, and in justice and equity a minimum wage of $6 a day, that day to consist of eight working hours.

The men proved that the cost of living has increased since 1914 at least 100 per cent, and has increased from March, 1919, to March, 1920, at least 20 per cent. They proved that the scale of wages paid to them under the award of the War Labor Board dated Aug. 12, 1919, as of June 3, 1919, and now in force, has been and is less than the wage scale paid by railways in many other cities.

To these propositions the company replied that the 51 cents an hour which the men have been receiving was a fair living wage and that the financial condition of the company absolutely forbade any increase in wages at this time. The public trustees of the road showed that since the road was taken out of the receivership in 1919 it has never earned the cost of service as defined in the statute which incorporated the company. They proved that each increase of fare for the last five years has resulted in a diminution in the public use of the system and in a percentage of increase in revenue much less than the percentage of the increase in fares.

In short the figures of the public trustees showed that in the aggregate the demands under the seventeen points at issue would more than consume that part of the total revenue of the road which is not devoted to wages. They offered evidence tending to show that they can hire all the men they need at present rates of pay and claim that the law of supply and demand has a decided bearing upon the question of whether the men are getting a living wage.

Mr. Ogden said that logical analysis seems to be this:

> 1. Are the street railway employees here considered, irrespective of the law of supply and demand, entitled to (a) a fair living wage; or (b) more than a fair living wage? If in each case the answer is "No," we need go no further; if in either case the answer is "Yes," then
> 2. Is the wage scale now in force equal to the requirements of (b) more than a fair living wage; or if not (b) is it equal to the requirements of (a) a fair living wage? If it is equal to (b) we need go no further; if it is equal to (a) we need go no further, if (a) is all that justice requires. If it is not equal to (a) then
> 3. Is the financial condition of the company an adequate answer to a demand for such increase? If so, we need go no further. If not,
> 4. What increase in the present wage scale shall be made to meet such demands?

In his finding he said in part:

> I do not decide whether the company could fill these positions at its present wage scale, because I do not regard a finding upon that disputed question of fact as conclusive one way or the other.
>
> The men strenuously argued that there are but two interested parties in this hearing—one themselves; the other the company—and that the neutral arbitrator has no right to take into account the interest of the public in any way.
>
> It has seemed, therefore, to the neutral arbitrator that the highest considerations of public policy require him to view the maximum demands of the men in the light of their necessary consequences upon the common prosperity, which is the Commonwealth. So far as these employees are not receiving a minimum fair living wage, undoubtedly they should have it, even at the cost of a receivership; so far as these employees, however, in their demands have gone beyond that minimum, and in so doing insist upon a rate of compensation the effect of which cannot fail to bring disaster upon these other interests, the neutral arbitrator has felt constrained to refuse them. The public may not assert its interest against a particular group to deprive that group of fair living wages; on the other hand, neither may any group in an essential public utility assert its individual interest against the public to profit inordinately at the expense of all others concerned.
>
> While I am convinced that the claim of the employees to a substantial increase of wages is justified, I do not believe that the claim of a minimum wage of $6 a day, or $2,000 a year, is warranted under the circumstances of this case.

Admitting that the men are otherwise entitled to an increase of pay, is the financial condition of the company a complete answer to such demand? The short and conclusive reply is "No." Federal judges have refused to allow full liberty to boards of arbitration to fix wages upon systems involved in receiverships and have insisted upon their duty and power to revise all findings. If a road is not in the hands of a receiver, however, the great weight of authority is in favor of the recognition of the power and duty of a board of arbitration to fix a minimum fair living wage for the employees, irrespective of the effect of such fixation upon the financial condition of the company. If the operation of miles of road, now non-productive, from original excess of optimism, the present existence of the jitney, or what not, should be accepted as a complete answer to a claim for higher wages, it would follow that the men might never get an increase, irrespective of their possible needs. This cannot be, and I have not therefore, in awarding what I deemed to be a minimum fair living wage, allowed the possible effect of such fixation upon the financial condition of the company to influence the amount of the award. That minimum must be a charge upon the revenues of the road if the line is going to operate within the Commonwealth of Massachusetts.

Based upon all the evidence I find that the wages which shall be paid to conductors and motormen, and employees of the mechanical and miscellaneous departments, shall be increased a total 20 per cent, the fraction in each case to count as an additional cent an hour. This will allow a small increase in the rate per hour above the increase in cost of living from June, 1919, to May, 1920, as shown by the best available figures, but no more than is amply justified by the considerations above set forth.

No arbitration hitherto has awarded a differential in excess of 5 cents to the operator of the one-man car. Upon many roads such operator receives no differential whatever. I think he is entitled to something, and decide the operator of a one-man car shall be paid a differential of 5 cents an hour.

So far as the eight-hour day is concerned I have given most anxious study to the very voluminous literature upon this subject which has been submitted to the board. From my general knowledge of the economic situation of the world to-day, however, both in Europe and in this country, I do not believe that any progress in this direction in this particular occupation is feasible at this time.

So far as the award seems inconsistent with the present financial exigencies of the corporation, I can only say that it is no more than the men are entitled to, and that the management, the public, and all who are interested in the preservation and maintenance of an adequate trolley service, must co-operate to secure the necessary funds. I am confident that the operatives, by ready, efficient, careful and economical effort, can and will co-operate to that end so far as their ability lies.

I think the present compensation paid for breaking in new men adequate and therefore do not recommend any change in Item No. 10. Conversely, I recommend no change in 15, 16, 17 and 18. The company cannot grant vacations. Conversely, what privileges under present conditions the men enjoy I think for the present they should retain.

I think that the fourteen-hour span which the men must remain on duty to earn their day's pay is too long, and if the amount of extra compensation awarded in another part of this opinion did not reach such tremendous figures in the light of the financial condition of the company I should cut down the span of the working day at least to twelve hours. Under the circumstances, however, and for the reasons set forth above, I recommend no change.

I fail to find any evidence presented that the employees are not at the present time receiving what is described in the opinion of the majority as "a minimum fair living wage."

In his dissenting opinion Mr. Carleton said:

No evidence was offered of any hardships or privations. The U. S. National War Labor Board adopted the principle that "in fixing wages minimum rates of pay shall be established which will insure the subsistence of the employee and his family in health and reasonable comfort." No evidence was offered that the present wages did not enable employees and their families to live in health and reasonable comfort.

In granting an increase of 20 per cent, with the provision that the fraction in each case is to count as an additional cent per hour, the board has granted an increase of 11 cents an hour, which is actually an increase of more than 21.5 per cent over the present wage of 51 cents. In other words, the award of the majority has exceeded by more than 5 per cent the actual increase in the cost of living since the award of the last War Labor Board. The majority decision, therefore, does not accurately follow the reasoning that it has tried to apply to the case.

In my opinion the increase awarded is grossly excessive from any standpoint. As shown in evidence each cent per hour of increase costs about $109,000. The increase of 11 cents as granted by the majority aggregates practically $1,400,000. This is as much as the interest on the entire funded debt of the company for a year. On July 1 the company was obliged to postpone payment of about $400,000 interest on its bonds as it was allowed to do under its mortgage. After Jan. 1, 1921, it has no such privilege. The enormous increase given seems to me to favor out of all proportion the employees at the expense of the holders of the bonds, whose money largely built the very line and cars upon which these men are absolutely dependent for their livelihood. The decision of the board is likely to mean that the people whose investment enables these men to earn a living will eventually lose their investment.

I agree with a recent decision of the United States District Court in Iowa, in which the Court stated as follows: "I have held several times I have no power to take interest due upon indebtedness and apply it upon the wages of the men, because in that event the mortgage would be foreclosed and the owners of the property would be deprived of every dollar of investment therein. The court has no power to deprive a man or corporation of its property in that way."

As shown in evidence the present payroll of the company takes 60.58 per cent of its passenger revenue. With the increase of $1,200,000 granted by this award, more than 71 per cent. of the revenue will be devoted to the payroll. No industry should be required to pay any such proportion of its revenue to its employees.

Finally and of paramount importance, the public, which pays this company its only income in the shape of fares and in this way pays the wages of its employees, deserves consideration. This is especially true of a public service corporation operated by public trustees appointed by the Governor under an act of the Legislature. The present fares of the company as shown in evidence are as high as any trolley lines anywhere in the country The granting of excessive wages to employees will mean one of two things—either numerous lines will have to be discontinued or the fares will have to be made higher than anywhere else in this country This system serves small industrial cities and rural communities where the average car-rider is in poor or very moderate circumstances. If fares are increased, as seems inevitable in face of the award, it is taxing an absolute necessity of many poor persons in order to pay these employees an excessive wage. If the cars have to be discontinued so that these people must walk, the unfairness to the public is self-evident.

Railway Insists on Co-operation

Houston Electric Company Refuses to Proceed with Franchise Election in City Divided Against Itself

Hopes are not bright at this time for an extension of the franchise of the Houston (Tex.) Electric Company. The matter has been up recently for consideration and an election was practically arranged, but the company in an open letter to the Mayor and City Council some time ago requested the city officials to call off the election on the service-at-cost grant. This action was predicated on the company's belief that the co-operation essential to the successful working out of the service-at-cost franchise was lacking. The company is continuing to operate on a 7-cent fare under the protection of a court decree.

THE conditions which led to the franchise negotiations will bear reciting. The company's condition since 1914 has been extremely precarious, due first to the jitney competition and then to the high operating costs brought about by the war. It asked many times for relief, but it was not until 1918 that the City Council passed the 6-cent fare ordinance.

Before that ordinance took effect, its operation was suspended by a referendum petition. At the election, the 6-cent fare ordinance was rejected and it was promptly repealed by the City Council. This left the company no alternative, and though reluctant to do so, it became necessary for it to go into the Federal Court to save its property from confiscation. The Federal Court, after a full hearing, enjoined the 5-cent fare ordinance. A 7-cent fare was then put into effect.

It had been publicly suggested to the company that a service-at-cost franchise might lead to an ultimate solution of the railway problem. The company, realizing the value of the good will and co-operation of the public, agreed to join with the city officials in endeavoring to work out such a plan. In entering into negotiations, therefore, it entertained the hope that they would lead to a clear recognition of the fundamental community of interest between the railway and the public, and would develop a helpful and sympathetic co-operation as the predominating feature. It seemed to the company that only on such a basis would a service-at-cost franchise work out in a manner satisfactory alike to the car-riding public and the city and the company. If this vital element was lacking, the company had grave fears for the successful operation of such a franchise.

A franchise was drawn as a result of many conferences between Mayor Amerman, Special Attorney W. J. Howard, City Solicitor B. H. Powell of the firm of Vinson, Elkins & Wood, Lamar Lyndon, the city's expert, and the officials of the Houston Electric Company. The officials of the company approached the negotiations with the desire to be frank and fair. The merits and demerits of every proposed franchise feature were discussed frankly at the conference, the endeavor of all parties to the negotiations being to draft a franchise which would be workable, and assure the city of a railway adequate to its needs and one which would enable the company to assume and fulfill its obligations thereunder.

When the representatives of the city and the company believed that they had arrived at such a conclusion, the proposed franchise draft was submitted to and carefully considered by the special railway committee of the expansion board, and later by the full expansion board, in a series of public meetings. Thereafter the expansion board indorsed the franchise and recommended its passage by the City Council. Subsequent events, however, seemed clearly to indicate that whatever the result of the election the company would not get that hearty support which it considered absolutely essential, for despite the long and conscientious work of the city representatives, and those of the company, and despite the approval of the franchise by the subcommittee and the expansion board, the City Council refused to pass the grant and send it to the people with their sanction. Thus, at the very beginning, even the city officials were divided. This division violated at the start the very spirit which was a moving factor throughout the negotiations. It was of so vital a nature that the company could not bring itself to believe it portended satisfactory results for the future. Thus convinced that no useful purpose would be served by continuing the matter, the company requested that the election be cancelled.

Omaha Men Appeal to Court

The wage controversy which has been pending between the Omaha & Council Bluffs Street Railway, Omaha, Neb., and its employees, for several months, has been taken to the State Supreme Court through an appeal filed by the trainmen's union against the recent decision of the State Railway Commission. A transcript and bill of exceptions have been filed with the higher court, but briefs will not be filed earlier than the middle of October.

The threatened strike has not been called and there are no present indications that it will be ordered, although the union leaders say they have been authorized by the men to call a strike if in their judgment such action should be the thing to do.

The State Railway Commission recently rendered a lengthy finding and order which was against the men in their contention for an increase of 13 cents an hour above the existing scale of 53 to 57 cents an hour. One of the declarations of the State Commission was that the men did not have the legal right to interrupt the operations of a common carrier by striking, although one of the commissioners gave a dissenting opinion on that point.

In taking their case to the Supreme Court the men will endeavor to have the Railway Commission's finding on the right to strike set aside and also have the whole case referred back to the State Railway Commission for rehearing.

This decision of the commission was referred to at length in the ELECTRIC RAILWAY JOURNAL for Aug. 28, page 428. In the finding the application of the trainmen for an increase of 13 cents an hour in wages was refused. This denial was based on the principle that an increased wage scale would necessitate an increase in fare and that step the commission decided was not fair.

Brooklyn's Striking Employees Abandon Hope

Governor Fails in Effort to Have Court Confer with Mr. Gompers—Receiver Advises Men to Return

Outstanding features this week in connection with the Brooklyn strike were the refusal by Judge Mayer of Governor Smith's request to confer with Mr. Gompers, president of the American Federation of Labor, and with J. H. Vahey, general counsel for the Amalgamated Association, and the appeal of Lindley M. Garrison, receiver of the Brooklyn Rapid Transit Company, to the men who are still out to return to work. Service is gradually being restored. On Thursday nearly the complete complement of rapid transit cars was in use and 737 surface cars were in operation on fifty-one of the sixty-seven lines of the company. Under fully normal conditions 850 surface cars are run. Seven surface lines and all rapid transit lines are being run at night.

JUDGE Mayer reiterated his determination not to deal with the Amalgamated. The Governor, Judge Mayer and Mr. Garrison are said to have been closeted for several hours. The only statement the Governor would make was that he had been unsuccessful in his effort to arrange a conference. Judge Mayer said:

> The Governor, Judge Mayer and Receiver Garrison had a conference this afternoon. The Governor stated that he had been visited by Mr. Vahey, the general counsel for the Amalgamated Association, accompanied by Mr. Gompers, and that they desired to have the Governor see if he could arrange a meeting with Judge Mayer.
>
> Judge Mayer stated to the Governor that his position had been deliberately taken and was well known. He had definitely determined and publicly stated upon more than one occasion that he would not deal in any way with the Amalgamated Association directly or indirectly, and that so far as he was concerned the matter was closed.
>
> He further stated that while under other circumstances he would, of course, meet Mr. Gompers, such a meeting at this time under the existing circumstances would not only be useless but would serve solely to prolong a situation which should be brought to an end. That it was obvious from the circumstances that Mr. Vahey and Mr. Gompers sought a meeting for the purpose of again going over the situation in respect of the Amalgamated Association. That Judge Mayer stated that his position had been fully, clearly and finally set forth in his letter to the Mayor dated Sept. 2, on which he stood.

"MOST HUMILIATING," SAYS MR. GOMPERS

Mr. Gompers let it be known that he considered the statement by the court to be "most humiliating." He said it was his purpose to suggest a way out of the present situation. This Judge Mayer, according to Mr. Gompers, resented without hearing "what might have been presented to him." It was Mr. Gompers' purpose to be observant in a difficult situation. This the court had declined. "This position," said Mr. Gompers, "is not judicial; it is autocratic."

Mr. Garrison's statement of Sept. 14 follows in full:

> Any one who has followed events could have foretold the failure of Mr. Gompers to extricate the leaders of the Amalgamated Association from their inextricable position.
>
> This marks, I trust, the end of the efforts of these leaders to buoy up their deluded followers with false hopes. The vast majority of the men were given no opportunity to vote on the calling of the strike. They left their work reluctantly and in large part they remained out because of their reliance upon the assurances of their leaders that each new move would result in reinstating the Amalgamated in control. One after the other these leaders have appealed to every local and state agency, each time assuring their followers that success would attend their efforts. Before the strike Commissioner Delaney's advice to the men was that they should not break off negotiations with the receiver. Mayor Hylan was then sought, with similar results.
>
> After the strike was called the leaders appealed successively to Acting Public Service Commissioner Barrett, then to the Mayor and the Board of Estimate, then again to the Mayor and Board of Estimate (the Governor being present), and the advice received by the men was to return to work. Later, upon Commissioner Nixon's return, he gave similar advice.
>
> In his letter of Sept. 2 Judge Mayer fully and finally stated his position.
>
> Nevertheless, later, some days after the strike began, Mr. Mahon, president of the Amalgamated, appeared on the scene, and his arrival was heralded as the positive assurance of success. No result came from his efforts. Finally Mr. Vahey, from Boston, the general counsel for the Amalgamated, appeared and enlisted the services of Mr. Gompers, with the result now known.

PLACES STILL OPEN

> During all this time the men have been without their wages, thereby producing a situation which is serious to them now and will grow worse. If the number of men still on strike is anywhere near what is claimed by the Amalgamated officers, the aggregate of the weekly wages of such men is well over $300,000. I have no faith that the Amalgamated Association or those that it can enlist in its cause will now or in the future pay these men this sum or any appreciable part of it.
>
> I hope that in their own interests the men will face their situation in the light of facts and no longer be cruelly deluded by false hopes I trust by this time that they fully realize that the courts and the receiver mean exactly what they say: that there is no hope now or in the future of the Amalgamated Association again being entrusted with the control. The one and only sensible course for the men to pursue is to return to work. We want and will welcome back our own experienced and trustworthy men, letting bygones be bygones. The agitators and disturbers are not wanted and will not be taken back.

Mr. Garrison said on Sept. 16 that the appeal of the strike leaders to all unions in New York city for financial support revealed that the "closed shop," despite assurances to the contrary, was the sole purpose of the strike on the B. R. T. lines.

St. Louis Men Insist Upon Advance

The employees of the United Railways, St. Louis, Mo., through their attorney, Edward Foristel, submitted arguments on Aug. 30 before the Public Service Commission in support of an application to re-open consideration of the wage scale. Last July the commission increased the wages of the employees 5 cents an hour. The employees want an increase of 20 per cent, but judging from the arguments submitted to the commission, would be satisfied with an increase of 10 per cent added to the 5 per cent already granted. An increase of 10 per cent would give the old employees 75 cents an hour, and would cost the company $1,600,000 a year, according to the estimates submitted.

Wages Increased in Spokane

Wage increases of from $12.50 to $17.50 a month affecting some 500 employees and amounting to approximately $100,000 a year have been announced by Vice-President F. E. Connors of the Spokane & Eastern Railway & Power Company, Spokane, Wash., retroactive to Sept. 1. Mr. Connors said:

> I have received word from Chicago headquarters to the effect that a wage increase recommendation made by me has been approved by the board of directors. The increase will amount to approximately $100,000 a year and will embrace all departments, including the office and depot people, with the exception of the car platform men.

All repair shop men, electricians, railway clerks and office employees are included. A year ago the company, then known as the Inland Empire System, suffered a strike of the electricians, machinists and other shop men, which it broke. The platform men remained at their posts, faithful to a recently signed contract which gave them better wages and improved conditions.

At that time Mr. Connors, then receiver, admitted the men who were on strike had a grievance in the matter of wages which he would gladly rectify if he could but that he was powerless. He agreed then that at the earliest date he could do so he would remedy the conditions about which complaint had been made. His statements of fact did not avert the strike, but he has now made good his word given at that time.

New Akron Grant Completed

The proposed franchise to be granted the Northern Ohio Traction & Light Company for the operation of cars in Akron has been practically completed. The sixty-day limit under which the company has been collecting a 5-cent straight fare expired on Sept. 15, but an extension is understood to have been arranged.

The new arrangement provides for service at cost. The city will guarantee the company 7 per cent return on the valuation of the company's railway property. The initial fare will be 5 cents, but this will be increased from time to time if it is shown by the company that additional fare is needed to pay the 7 per cent and also to carry out other provisions of the new contract.

The company has agreed to open its books for inspection by the city under conditions imposed by the city and also to agree to the appointment of a utilities commissioner whose duty it will be to keep in close touch with the complete operations of the company and to make reports to Council. The valuation upon which the city will insure the company a 7 per cent return is to be determined by the city and the company jointly, under the new contract.

A feature of the proposal is that an auto bus system is provided to supplement the street railway system. There is a special incentive to the company to hold fares to 5 cents.

News Notes

Increase for Savannah Men.—H. C. Foss, receiver of the Savannah (Ga.) Electric Company, stated on Aug. 26 that effective on Sept. 1 the compensation of conductors and motormen would be increased from the present rate of 38 cents to 42 cents an hour, and 41 cents to 46 cents an hour. One-man car operators are now receiving a bonus of 4 cents an hour.

Pittsfield Men Accept.—Announcement was made on Aug. 31 that the union had accepted by a small majority the latest offer of the Berkshire Street Railway, Pittsfield, Mass., which was for an increase of 16 per cent over the wages of last year and 10 cents an hour extra for one man cars. Conferences will be held shortly for the purpose of signing the agreement.

Wage Rise in McAlester.—After negotiations covering a period of thirty days, the employees of the Pittsburg County Railway, McAlester, Okla., have been granted a wage increase. The employees of the Choctaw Power & Light Company, an associate company, also receive wage increases. The wage advance ranges from 26 to 40 per cent and affects all employees except office men.

Railway Electrification in South Africa.—United States Trade Commissioner Lundquist reports from South Africa that a sum of $48,665 is included in the railway estimates for the coming year for electrification purposes, the same apparently being provided for the preparation of detailed plans and specifications for electrification of a part of the main line between Durban and Glencoe Junction, in Natal Province.

Western New York Line Advances Pay.—Announcement was made on Aug. 30 that employees in car service on the lines of the Western New York & Pennsylvania Traction Company, Olean, N. Y., receive a raise in wages amounting to 5 cents an hour, effective Sept. 1. Carmen in passenger service receive from 43 to 48 cents an hour now and new men in freight service the same. Older men in freight work get 50 cents an hour.

Holyoke Men Demand $7 a Day.—On Aug. 31 the union of employees of the Holyoke (Mass.) Street Railway presented demands to the company for a wage of $7 a day and a straight eight-hour day with one day off in fifteen with pay. The demands also call for a pension system in effect after twenty years' service or after an employee has reached sixty years of age. Repairmen and others demand a 40 per cent increase.

Suggests Alternative to Wage Increase.—Replying to the demand of motormen and conductors of the West India Electric Company, Kingston, Jamaica, for increased pay and altered conditions of work, the manager says he has recommended to the directors in Canada that the men should get time and a half pay on two holidays, and in lieu of an increase each man should receive a life insurance policy of $500.

Wage Settlement at Lexington.—George McLeod, representing the Kentucky Traction & Terminal Company, at Washington, in a wage dispute before Hyell Davies, federal conciliator, agreed to an increase of 7 cents an hour for employees of the Kentucky Traction & Terminal Company, according to a wire received by General Manager J. P. Pope, on Sept. 9. The workers asked for 20 cents an hour increase, from 40 cents to 60 cents, but will get 47 cents. It was decided that an increase of 7 cents an hour would meet the needs of the men on the basis of increased living costs.

Program of Meeting

Ninth Annual Safety Council

The National Safety Council has completed the program for the Ninth Annual Safety Congress which is to be held at the Auditorium, Milwaukee, Wis., Sept. 27 to Oct. 1. There will be two electric railway section sessions under the chairmanship of R. N. Hemming, superintendent of transportation, Indiana Service Corporation, Ft. Wayne.

The addresses to be delivered before the electric railway section are as follows:

"The Enforcement of Laws and Ordinances Relating to the Operation of Self-Propelled Vehicles," by J. A. Van Osdol, general attorney of the Union Traction Company of Indiana.

"Advertising Campaign to Reduce Automobile and Street Car Accidents," by Charles B. Hardin, general claim agent of the United Railways, St. Louis.

"Public Safety," by C. M. Talbert, chairman of the Public Safety Section of the National Safety Council.

"The Necessity for and Importance of Observing Operating Rules":

(a) "Safety Department," by Hugh Wilson, safety department of the Northern Ohio Traction & Light Company.

(b) "Claim Department," by F. T. Holliday, claim agent of the Gary (Ind.) Street Railway.

(c) "Transportation Department," by C. E. Thompson, assistant to the president of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.

"Duties and Responsibilities with Reference to the Safety of Employees Under the Jurisdiction of Foremen and Men in Advisory Positions," by J. H. Mallon, Chicago, Ill.

There will be papers of interest to electric railway men to be read before the public utilities, public safety and other sections. The annual banquet will be held at the Arena on Sept. 30.

Financial and Corporate

May Reinstate Shore Line

Public Concerned When It Is Realized Tracks Are Being Torn Up—Operating Arrangement Proposed

The Shore Line Electric Railway, Norwich, Conn., the tracks of which from New Haven to Flanders were recently sold for junk, may not be allowed to die, though apparently the final gasp had already been made. Citizens along the western half of the abandoned part of the system grew much concerned over their transportation future when they saw men actually at work tearing up the one fixed line of local communication and are proposing to form an organization to buy the property and have it operated by the Connecticut Company, New Haven Division. Options have been secured from the present owners of the "junk" and negotiations are fast proceeding toward restoration of service.

BUS LINE QUITS

The Shore Line, operating more than 160 miles of single track in and between New Haven, Guilford, Saybrook, New London, Norwich, etc., was closed down entirely by a strike in May, 1919. The Norwich Division, New London to Norwich, and suburban to New London out to adjacent shore resorts, was started up again and is now operated by the Connecticut Company. That part of the New London-New Haven line from Flanders to New Haven, about 44 miles, however, was never brought to life and was recently sold for junk. From New Haven to Guilford, 16 miles, there is an all-year service demand, but, from Guilford east, about the only business is that of summer residents of the numerous shore resorts. During the past spring and summer, a bus line has operated from New Haven as far east as Saybrook, 33 miles, and another line as far as Madison, 22 miles, but the former ceased operation recently and the experience of last winter rouses no hopes for a continuation of the latter line, with any regularity, this coming winter.

BUSINESS MEN ACT

As a result a group of interested business men from Foxon, a growing Italian suburb; North Branford, the seat of a large trap-rock industry, and Guilford, formerly dependent on the Shore Line, has arranged with the present owners not to tear up any of the line west of Madison and is raising money and working on an organization to take over the 16 miles at a price of $10,000 per mile. An effort is also being made to interest Madisonites in assisting so that they may take over the other 6 miles to Madison. Indications are that the first 16 miles will surely be put in operation and probably the other six.

As to operation, it seems impracticable to try to utilize the heavy rolling stock of the Shore Line Electric Railway, and present plans indicate the use of one-man safeties. Gasoline-motor cars have been discussed, but as the overhead is still in good condition, electric power will probably be used.

The Connecticut Company has agreed to operate the line at cost plus a fixed sum for management and operating charges. The line will be manned by Connecticut Company employees and operated practically as a part of the New Haven Division.

Seattle Increase Helpful

Average Daily Revenue of Municipal Railway Increased 27 per Cent Under Fare Advance

Figures compiled by the Seattle (Wash.) Municipal Railway Department show that one month's operation under increased fare has resulted in an increase of 27 per cent in the average daily revenue, and a decrease of 6.6 per cent in the average daily number of passengers.

Railway department officers assert that in the face of the estimates made at the time the city was considering the increase in fare, the increase in revenue is measuring up to expectations. The estimated increase in revenue on the 6¼-cent fare basis made at that time was 30 per cent, a difference of only 3 per cent over the actual showing for thirty-one days from July 24, when the new fare became effective, to Aug. 23, inclusive.

Figures submitted to Mayor Caldwell show that from July 24 to Aug. 23, inclusive, the actual revenue under the increased fare was $496,034; under the old fare, the revenue would have been $388,972, showing an increase under the new fare of $107,061, or 27.5 per cent.

The daily average under the old fare would have been $12,547; under the new, it was $16,001, or an increase of $3,543. The daily average of passengers carried for the period from July 24 to Aug. 23 inclusive was 324,101, compared with 347,037, for the period from June 26 to July 23, inclusive. The average daily decrease in passengers compared with the period immediately preceding the increase in fare was 22,936 during the thirty-day period stated. The net decrease figures 6.6 per cent.

Figures prepared by the department show that the municipal railway system carried 630,559 more passengers in the first seven months of 1920 than in the corresponding period for 1919. From Jan. 1 to Aug. 1 the number of passengers carried was 74,832,148, compared with 74,201,589 for the same period in 1919.

Railway Would Sell

Price Made to Ontario Hydro-Electric Commission for Toronto Railway and Allied Lines

Negotiations which have been carried on between Sir Adam Beck, chairman of the Ontario Hydro-Electric Power Commission, and Sir William MacKenzie, president of the Toronto Railway, have reached the point where a price has been made by Sir William MacKenzie for the sale to the Power Commission, on behalf of the Ontario Municipalities, of the Toronto Railway, the electric power generating plant at Niagara Falls belonging to the Electrical Development Company of Ontario, the transmission lines from Niagara to Toronto and the distribution system in Toronto belonging to the Toronto & Niagara Power Company; also the Metropolitan Railway line on Yonge Street and the Port Credit and Scarborough radial lines.

POWER CONTRACT A FACTOR

The quoting of a lump price will place upon Sir Adam Beck the responsibility of apportioning the cost to be borne by the city of Toronto and the other Hydro power and Hydro-radial municipalities which are now using the Hydro-Electric power.

The prime consideration which it is reported is impelling Sir Adam Beck toward acceptance of the offer of the MacKenzie interests is the fact that in October next a five-year contract with the Toronto Power Company expires under which that company supplied the Ontario Power Company (now owned by the Hydro-Electric Power Commission) with 13,000 hp. at $13 per horsepower.

The Hydro Power Commission has been notified that this supply of power will be cut off. This would cause much embarrassment to the Hydro Commission in view of the fact that the latter is now short of power owing to the great demand made upon it. As the Toronto Power Company (owned by the Toronto Railway-MacKenzie interests) can readily get $35 per horsepower at present, it is not surprising that the company refuses to renew the contract with the Ontario Commission.

$28,000,000 OF SECURITIES INVOLVED

This important deal will include the local power, light and radial and railway lines in Toronto. It will involve approximately $28,000,000 of bonds and securities. Before the purchase can be consummated the consent of the Provincial Government will have to be obtained.

It would cost about $2,500,000 and take nearly a year to link up the Hydro substations with the Toronto Railway system in order to give a service next September when the railway franchise expires. In addition it is doubtful if the Chippewa development will be ready when the City Corporation of Toronto proposes to take over the property included in the Toronto Railway system next year.

Receiver Appointed for Kansas City Railways

Frank C. Niles Named Temporarily Pending Hearing on Sept. 30—Second Receivership in Nine Years

The Kansas City (Mo.) Railways went into involuntary bankruptcy on Sept. 9, on the petition of the Kansas City Refining Company, Kansas City, Kan. The amount of the debt, incurred for oil and material since July 1, 1920, was $21,404. There was no other petitioner. Acting on the application of the fuel company Judge Kimbrough Stone, sitting for Judge Arba S. Van Valkenburgh in the Federal Court, named Frank C. Niles, president of the Niles & Moser Cigar Company, temporary receiver. Mr. Niles will serve until Sept. 30, when a hearing to name a permanent receiver will be held in the Federal Court. Bond for Mr. Niles was fixed at $50,000. He was one of the original city directors of the reorganized Kansas City Railways under the new franchise and was reappointed in July, 1916.

On July 3, 1911, the local company, then known as the Metropolitan Street Railway, was placed in the hands of R. J. Dunham, Chicago, and Ford Harvey, Kansas City, as receivers. This receivership terminated on Oct. 26, 1916, following the reorganization of the company under the name of the Kansas City Railways, July, 1914. It has continued since that time under the present management. This, then, is the second receivership that has occurred in the last nine years.

In the application for a receivership the Kansas City Refining Company set forth the following facts regarding the condition of the Kansas City Railways, which were admitted by the company in a bill of acceptance:

> That the railway company operates 370 miles of track and equipment for the same in Kansas City, Mo., Kansas City, Kan., Independence, Rosedale, and in territories outside of those cities.
>
> That it has a capital stock of $30,000,000 of which there has been issued and is outstanding stock to the amount of $100,000.
>
> That the company is subject to a first mortgage dated in July, 1916, bonds of which are outstanding in the sum of more than $27,508,800.
>
> That it also is subject to a second mortgage dated in July, 1916, bonds of which are now outstanding in the sum of $5,290,000.
>
> That $11,590,600 of the first mortgage bonds have been pledged under indentures to secure gold notes of the company totaling $8,500,000 and that $1,000,000 of these notes are not paid, although due.
>
> That the company defaulted in the payment of the interest due upon the first mortgage bonds on Jan. 1, 1920, and again on July 1, 1920.
>
> That it defaulted in the payment of the interest on the second mortgage bonds and secured gold notes, which defaults have continued more than sixty days and are still unpaid.
>
> That the company owes the Kansas City Refining Company $21,404 for materials and supplies.
>
> That the company has been operating at a loss and has not been paying its operating expenses.
>
> That the fare increases granted by the public authorities of Kansas and Missouri, upon whose decision the right to collect increased revenue depends, have not been sufficient to keep the concern going.
>
> That 2,000 suits are now pending in the various courts in which damages to the extent of $20,000,000 are asked and that the company will be without means to meet judgments recovered in such suits.
>
> That the railway has current liabilities in excess of $5,500,000, represented by notes payable for materials, equipment, taxes, and supplies for $2,230,000; vouchers payable for the same, $625,000; accounts payable for the same, $110,000; wages due employees, $400.000; moneys due to city for Twenty-third Street viaduct, $190 000, and accrued and matured interest, $2.000,000.
>
> That judgments which have not been satisfied are now in the courts of Missouri and Kansas against the company totaling approximately $800,000, which include judgments rendered in the recent term of the Circuit Court for $180,000.
>
> That the company is without means to fight such cases or properly handle them.
>
> That there is an additional several million dollars of indebtedness arising from the default of the first and second mortgage interest payments.
>
> That the creditors are pressing the company for immediate payment and that some of these creditors have threatened to bring suit and levy executions upon the company's property.
>
> That there is danger that the lines of the company may be broken up and operated separately.
>
> That the cities through which the lines run are making claims for large amounts of capital expenditures, totaling nearly $1,000,000, which cannot be obtained.
>
> That there is a possibility that the company, through its financial condition, may default its franchise, and that the rights of the creditors should be ascertained and a receiver appointed.

Total liabilities are estimated at $37,917,000. The company's assets as fixed by the Missouri Public Service Commission at the hearing for increased fare last year are $27,866,345. This leaves a total liability over and above the assets of more than $10,000,000.

Following a conference of the officials of the Kansas City Railways, Col. Philip J. Kealy, president, gave out a statement in which he attributed the company's present situation to the failure of the public to grasp the full significance of conditions, of three years' standing. He said:

> The Kansas City Railways has been compelled to accept a receivership of its property by reason of the increased indebtedness that has been constantly piling up for the past three years. The public from time to time has been advised of the growing indebtedness of the company; but for one reason or another, the public has apparently not fully realized the seriousness of the company's situation. Contrary to the popular notion, the Kansas City Railways is not owned by one man, or by any single interest, but is really the property of some 6,000 investors in its securities. Numerous savings banks, trust estates, life insurance companies and other such institutions, as well as private individuals, are the owners of the securities of the Kansas City Railways, and they have been the real sufferers from the inability of the company to make both ends meet.
>
> The difficulties of the company date back more than three years, when the railway began to feel the effect of war inflation on prices of materials and labor. Such increases have continued progressively. The adjustments of fares have not been sufficient in time or amount to overcome the increased cost of operation.
>
> The directors and the representatives of the securities holders have put forth strenuous efforts to avoid a receivership. Large sums of money have been advanced with which to continue the company's operation and meet its most pressing obligations. For example, representatives of the bondholders advanced nearly $500,000 last February to pay the taxes on the property due for the year 1919; and a year ago, several of the Kansas City banks united in advancing to the company $400,000 out of which the company met its payrolls.
>
> The physical condition of the property, upon the whole, is very good. There is sufficient business in Kansas City to justify the continuance and full operation of this property upon a basis that is fair, both to the public and the investors. I believe that even now, with the proper kind of co-operation, this property can be put upon such a basis that the revenues will pay all reasonable operating expenses, provide an allowance for future replacements and afford a reasonable return to the investors.

The company's officials repeatedly have complained to the city that the operation of jitneys has reduced the company's revenue between $3,000 and $5,000 daily. This curtailment of income, in addition to the advanced cost of operation and maintenance, it had been prophesied, would lead to a receivership.

The first official order of Frank C. Niles, temporary receiver, was to the effect that all the officers and employees of the company were appointed as officers and employees of the receiver. No steps will be taken in the actual work of adjusting the company's financial difficulties until the court names a permanent receiver.

New Haven Changes Explained

There is misunderstanding, explains the Boston *News Bureau*, in the financial district relative to the granting of approval in the United States District Court, New York, for a merger of the Harlem River & Portchester Railroad and the Central New England Railway with the New York, New Haven & Hartford Railroad. Press accounts as to what the New Haven sought have been inaccurate and obscure. The *News Bureau* says that the New Haven actually asked:

> 1. Permission to merge the Harlem River & Portchester.
> 2. Permission to merge the Central New England.
> 3. Direction to trustees of the Connecticut Company stock to vote for a mortgage to secure Consolidated Railway debentures amounting to $10,884,000.
>
> The merger of the two roads with the New Haven is both a logical and desirable development. The New Haven owns all of the Harlem River & Portchester stock and all but 50 shares of the capital stock of the Central New England.
>
> These roads are really integral parts of the New Haven system and a merger is both in line with past policy of the New Haven and with the evident intent of the transportation act which permits mergers where desirable in the public interest.
>
> The only obstacle to carrying this out, so far as the New Haven was concerned, was possibly the federal decree of dissolution for the New Haven. Accordingly, the New Haven asked the court to modify the decree to permit the merger. As the department of justice agreed to this the District Court signed the order.
>
> The real purpose in asking the Court to require the Connecticut Company to secure the Consolidated Railway debentures by a mortgage on its property was to relieve the New Haven, if it should ever mortgage its own property, of the necessity of securing these debentures by such mortgage.
>
> The Consolidated Railway, which formerly owned, controlled or leased a large number of electric railways and public utilities in New England, was merged with the New Haven in 1910. The 400,000 shares of stock of the Connecticut Company, controlling trolley lines in Connecticut, are owned by the New Haven but are in the hands of trustees under the dissolution decree.

Judge Mayer, in the District Court, declined to grant the New Haven's request with reference to the Connecticut Company until the electric railway situation in Connecticut has been straightened out to greater extent.

City Wants Fund

Asks That Dividend Over 6 Per Cent Be Returned by Cleveland Railway—Company Going Behind

The Mayor of Cleveland, Ohio, has ordered Street Railroad Commissioner Fielder Sanders to make formal demand on the Cleveland Railway for the return of $72,000 paid stockholders on April 1 as dividends at the rate of 7 per cent. If the $72,000 is paid back it will keep the interest fund, the fare barometer, from going below $300,000 as of Aug. 31, and will put off a fare increase until the interest fund goes below that figure despite the addition of the $72,000.

It is understood the company takes the position that the $72,000 was paid legally because petitions for the referendum, which defeated the dividend increase from 6 to 7 per cent, had been held invalid by the Common Pleas Court at that time. It was on additional petitions that the election was brought about which defeated the dividend increase Aug. 10.

A report made by city accountants to Commissioner Sanders showed that in June, July and August the actual cost of operating the system exceeded the income by $415,087 under the present rate of 5 cents.

The company has operated under a deficit of 2 cents a car-mile in the last six months, President John J. Stanley advised Council. That is why he asked for an additional allowance of 4 cents a car-mile for operation, 2 cents to make up the deficit and 2 cents to break even in the ensuing six months.

Accountants have reported to Commissioner Sanders the receipts, costs and deficits in the three months after the new wage increase of 25 per cent went into effect May 1 as follows:

May—Receipts $1,498,405.52; cost of service $1,542,056.96; deficit $42,651.44.

June—Receipts $1,507,526.76, cost of service $1,731,869.10, deficit $224,342.34.

July—Receipts $1,531,008.56, cost of service $1,679,101.84, deficit $148,093.28.

This is a partial report. As soon as the report is complete, Mayor FitzGerald will call a meeting of the street railway committee and ask as to the city's course on the allowance demands.

Utility Investments Will Be Stabilized

Large speculative profits in public utility securities are a thing of the past, according to H. M. Addinsell of Harris, Forbes & Company, New York, N. Y., investment bankers, who is a member of the public utility committee of the Investment Bankers' Association. It is his contention that securities of this character, because of the public necessity which the industries serve, and because of the regulation which is consequently put upon them, will eventually become in the nature of quasi-municipal securities enjoying somewhat the same degree of stability as municipal issues.

In an address at New London on Sept. 15 before the annual convention of the Association of Edison Illuminating Companies he emphasized the fact that the public utilities need fair play and a square deal. After discussing the various methods of financing that are open to these properties and the necessity for regulation sufficiently elastic to permit changes in rates to meet varying costs of operation, he said in part:

> We may just as well face frankly the fact that the day of possible large speculative profit in public utility securities is passed.
>
> With the regulation that exists and the incontrovertible fact that these industries are an indispensable and permanent part of the economic structure of the communities they serve they are becoming, and I think will become, increasingly of the nature of quasi-municipal securities.
>
> I look forward to the day when the public utility practice and financing will be so standardized and stabilized that the securities of these companies, at first in the larger communities and eventually everywhere, will command a market closely approximating—both as to level and real marketability—that enjoyed by the obligations of the municipalities themselves.
>
> I think that eventually some combination of the indeterminate permit and service-at-cost franchise will be universal. I perhaps should mention, however, that in view of recent experience, to be satisfactory, such franchises should contain no maximum rate and should provide a cushion in the form of a reserve fund to take up slack pending the readjustment of rates and thus insure continuously to the companies the fair rate of return on their investment that is contemplated by such a franchise. So the broad solution lies in frankly putting the cards on the table and letting the light of publicity shine on the problems and purposes.

New York Gross Increases

Deductions, However, Overbalance Gross Income—Net Corporate Income Shows a Deficit

The October-December, 1919, quarterly report of the revenues and expenses of the surface and rapid transit electric railways operating in New York City has recently been issued by the Public Service Commission for the First District.

The summary shows that passenger revenue has increased $5,823,929 or 23.8 per cent over the 1918 quarter. Operating expenses increased by 31 per cent from $18,671,000 in 1918 to $24,445,000 in 1919. Total deductions from the gross income of the various companies increased about the same amount as the gross income itself.

NET CORPORATE INCOME UNCHANGED

Net corporate income was approximately the same as the corresponding quarter a year previous, the increase in deficit being only $40,000. This made a total deficit of $2,392,061 for 1919. The operating ratio increased only 3.3 per cent, although approximately 90,000,000 more passengers were carried than in 1918, and the car-miles increased by 4,000,000 or 4.7 per cent.

EARNINGS OF NEW YORK CITY COMPANIES

Quarter October—December	1919	1918	Percentage Change
Passenger revenue	$30,320,201	$24,496,272	+23.8
Other transportation revenue	195,436	177,757	+10.0
Total revenue from transportation	$30,515,637	$24,674,029	+23.7
Other railway operating revenue	2,222,644	1,431,577	+55.3
Total railway operating revenue	$32,738,281	$26,105,606	+25.4
Operating expenses:			
Maintenance expended	$6,101,896	$5,137,886	+18.7
Depreciation reserve	562,993	Cr. 903,074	+162.5
Operation of power plant	4,462,132	3,729,806	+19.6
Operation of cars	11,242,763	8,566,902	+30.9
Injuries and damages	888,866	1,253,400	—29.1
Traffic and general expenses	1,186,483	885,593	+33.9
Total operating expenses	$24,445,132	$18,671,513	+30.9
Net operating income	$8,293,149	$7,434,093	+11.6
Street railway taxes	1,820,784	1,914,442	— 4.9
Operating income	$6,472,365	$5,519,651	+17.3
Non-operating income	$1,099,677	1,062,834	+ 3.5
Gross income	$7,572,042	$6,582,485	+15.0
Deductions from gross income:			
Interest	$5,552,298	$4,557,012	+21.8
Rents	3,769,038	3,956,348	— 4.7
Miscellaneous	642,767	421,831	+52.5
Total deductions from gross income	$9,964,103	$8,935,191	+11.5
Net corporate income	*$2,392,061	*$2,352,706	— 1.7

* Deficit.

TRAFFIC AND MISCELLANEOUS STATISTICS OF NEW YORK CITY COMPANIES

Quarter October—December	1919	1918	Percentage Change
Miles of track, exclusive of storage and yard tracks	1,789.62	....	......
Average daily maximum number cars operated (Dec.)	8,069	....	......
Passenger car-miles (active)	85,454,471	....	......
Car seat miles	4,267,022,623	....	......
Total revenue car-miles	87,099,022	83,151,313	+ 4.7
Passenger car-hours	7,253,771	....	......
Ratio C. M. to C. H. (speed m.p.h.)	11.76	....	......
Revenue passengers	603,472,394	491,785,623	+22.7
Revenue transfer passengers	12,587,642	....	......
Total revenue passengers	616,060,036	491,785,623	+25.3
Free transfer passengers	32,120,419	66,821,552	—51.9
Total passengers	648,180,455	558,607,175	+16.0
Operating ratio	74.67	71.38	+ 3.3
Statistics per car-mile:			
Operating revenue (cents)	37.55	30.21	+24.3
Operating expenses (cents)	28.10	22.48	+25.0
Net income (cents)	*2.75	*2.83	— 2.8
Number of passengers (total)	7.44	6.73	+10.5
Car-miles per revenue passengers	0.144	0.169	−14.8

* Deficit.

Mr. Allen Has Plan to Rescue Road

C. Loomis Allen, president of the Syracuse & Suburban Traction Company, Syracuse, N. Y., has sent to Ira L. Terry, chairman of the committee appointed by the Long Island Real Estate Board, a sketch of his proposal for the operation of the New York & North Shore Traction Company, which has recently discontinued service on its lines between Flushing and Roslyn.

His proposition is that the line should be purchased outright, that the power house at Douglaston, which has long been a burden to the company, be disposed of and that power be purchased. He further believes that one-man cars should be substituted for the present equipment.

Mr. Allen considers that about $350,000 would be sufficient to purchase the road and meet all these needs. He bases his belief that the road could be put on a sound operating basis on the decision of the Court of Appeals that the Public Service Commission had a right to grant an increase in fare to the line if the franchise had been granted since the passing of the law creating the commission.

In the matter of fares Mr. Allen has indicated further that Long Island residents are willing to pay an increased fare if the operation of the cars is assured them. The Real Estate Board will consider the proposition of Mr. Allen and if thought practicable a stock corporation will be formed.

Financial News Notes

May Issue Common Stock.—The Public Service Commission for the Second District on Aug. 27 authorized the International Railway, Buffalo, N. Y., to issue $792,500 in common stock. Proceeds to be realized from the stock are to be used to pay for additions and betterments to the railway.

Deferred Dividends Paid.—A dividend of 2½ per cent was paid on Aug. 20 on the preferred stock of the Washington Railway & Electric Company, Washington, D. C. This represented the quarterly disbursements of 1¼ per cent which were due on March 1 and on June 1 and on which no action was taken because of the poor financial condition of the company. No action has been taken on the quarterly dividend that fell due on Sept. 1.

Interest Payment Postponed.—The directors of the Hudson & Manhattan Railroad, New York, N. Y., at their August meeting decided that income from operation has been insufficient to permit the resumption of interest payment on the 5 per cent income bonds on Oct. 1. It was explained that this was but a formal action, as there has been no intention of resuming payments at this time.

Municipal Line Going Behind.—The report of operation of the Tacoma (Wash.) Municipal Railway for the month of July shows a loss of $5,010. Operating revenues amounted to $11,879, with operating expenses of $13,916. Interest on the investment and other charges against the line ran the deficit to more than $5,000. Commissioner Harrison hopes to reduce operating expenses by the use of one-man cars, which are under construction at the present time.

Corporate Changes Planned.—A company bearing the name of United Light & Railways Company was incorporated under the laws of Delaware on Sept. 8 with a total authorized capital of $50,000,000. This action, it is understood, is in line with a plan to be presented to the directors of the existing United Light & Railways Company, Grand Rapids, Mich., shortly, a scheme for changes in the corporate organization and in the capitalization.

Interest Payments Put Over.—The trustees of the Eastern Massachusetts Street Railway, Boston, Mass., state that coupon interest due on Sept. 15, 1920, on $972,000 of Series C bonds, amounting to $29,160 and coupon interest due on Oct. 1, 1920, on Series D bonds, amounting to $24,180 will not be paid at maturity. The public trustees have been obliged to extend this interest under moratorium privilege of the mortgage indenture, because the company has no available income for its payment.

Will Abandon Penn Line.—By authority of the State Public Service Commission, the Waverly, Sayre & Athens Traction Company, Waverly, N. Y., will abandon a portion of its line in Pennsylvania. The parts of the line to be given up are those found by the commission to be unremunerative and such a burden that to require continued operation under the circumstances would be unreasonable. They comprise 2,000 ft. at the extreme southern end of the line at Athens, and the South Waverly branch.

Bluefield Traction Deal Completed.—President Hardy and General Manager Evans of the Princeton Power Company have reported to the board of directors of the Bluefield Chamber of Commerce that at a meeting of the stockholders of the Princeton Power Company held recently plans for taking over and operating the railway system of the Appalachian Power Company, in Bluefield and Graham, W. Va., had been approved, and that within sixty to ninety days the line would be under the new management. Relative to the suggestion of changing the name of the Princeton Power Company in order that Bluefield would appear in the official title it was decided to appoint a committee from the Bluefield chamber to confer with a similar committee from the Princeton Chamber of Commerce. The name Bluefield-Princeton Traction Company is one to be considered.

Consolidation Talk Again.—The city lines of the Spokane & Eastern Railway & Power Company, Spokane, Wash., carried 765,181 passengers during the month of July, from whom it collected $40,026 in 6-cent fares. The cars were operated 168,685 car-miles at a cost including depreciation of $45,620. Plans for the consolidation of this property with that of the Washington Water Power Company, are again being discussed and have reached the same stage as when the matter was in the air several years ago, namely, a committee of engineers and accountants has practically completed the assembling of data which will show the gain to be made by the elimination of competing lines and the building of physical connections. Jacob Taylor, Chicago, president of the Spokane & Eastern Railway & Power Company, is expected in Spokane soon, at which time the consolidation plans are to be taken up again.

Abandoned Road Reported Sold.—The recently incorporated North Carolina Lines, Inc., Charlotte, N. C., is reported to have purchased the franchise rights of the Charlotte Rapid Transit Company. The latter road went into the hands of a receiver in 1918 and its effects were sold early in the present year at auction. The property consists of 2 miles of track and overhead work with some additional poles, ballast material and other supplies. Service was discontinued on May 19, 1918. Reference to the affairs of the company was made in the ELECTRIC RAILWAY JOURNAL for March 27, 1920, page 669. The North Carolina Lines, Inc., contemplates constructing an electric railway from Charlotte to Winston-Salem. Among the incorporators are Harry F. Hahn, Winston-Salem, and John McGibbons, vice-president of the U. S. Fidelity & Guaranty Company, Baltimore.

Viaduct Payments Not Made.—The Hecker Construction Company, building the Twenty-third Street viaduct, has complained to Mayor Cowgill that the Kansas City (Mo.) Railway is in arrears in the payment of its proportion toward the construction of the viaduct, estimated to cost $750,000. The company's proportion, including engineering and inspection fees, amounts to $267,000, and all it has paid of this amount is $25,000 in cash and $30,000 in materials. Philip J. Kealy, president of the railway, said he thought if the city advanced the $85,000 the company could pay it back shortly from revenues anticipated as a result of negotiations pending for the sale of carhouses at St. John and Denver Avenues and Montgall and Nicholson Avenues respectively and the sale of the present buildings used for general headquarters at Fifteenth and Grand, and the sale of power houses, substations and transmitting lines to the Kansas City Power & Light Company. The receipts from the sales to the light company were estimated at $6,500,000.

Traffic and Transportation

Would End All Transfers

President Mitten Proposes New Plan to Meet P. R. T. Needs—Would Yield $350,000 Monthly

Abolition of all transfers of whatever nature is now proposed by Thomas E. Mitten, president of the Philadelphia (Pa.) Rapid Transit Company, as a temporary solution of the system's financial problems. Under the new plan as outlined by Mr. Mitten on Sept. 14 in a letter to the Philadelphia City Council the basic 5-cent fare would be retained.

FRANCHISE DRAFT PRESENTED

The issuance of the 3-cent "exchange tickets," as well as free transfers, would be discontinued. Mr. Mitten estimates that the company's revenue would thus be increased to a sufficient extent to enable it to pay the carmen the wage increase due them.

With his letter to Council, Mr. Mitten submitted a draft of a proposed ordinance granting to the P. R. T. permission to apply to the State Public Service Commission for approval of the new fare system. The proposed tariff change would be temporary in character and would remain in force until the commission, on the basis of the valuation of the company's properties now under way, had been able to fix a permanent rate.

Mr. Mitten pointed out that the company's need of immediate financial relief resulted from the failure of the Union Traction Company, chief underlying company of the P. R. T. system, to sanction an issue of $6,000,000 in equipment trust certificates. Under a continuance of existing conditions at the end of the current year, Dec. 31, the company will be short approximately $2,000,000 and at the rate of about $4,500,000 for the next twelve months. Of the P. R. T.'s present condition, Mr. Mitten said:

> Increased revenue is immediately necessary not only to meet the already overdue wages of the men and other increased costs of operation but also to place the company in a position properly to handle the rush-hour traffic of the coming winter and later to operate city-built lines.

MR. MITTEN'S LETTER

The discontinuance of all transfers is expected to yield increased revenues of $350,000 monthly.

Mr. Mitten's letter follows in part:

> P. R. T. has for ten years past increased in prosperity under present direction. Until overcome by war-time costs P. R. T. has consistently increased its earning capacity; nevertheless, in its endeavor to improve service, has confined its dividend payments to but 5 per cent per annum, and has put back into the property by way of improvements over $4,000,000 of its net earnings which might otherwise have been used to make payment on account of the deferred dividends due to P. R. T. stockholders at the rate of 6 per cent per annum under the terms of the 1907 agreement. * * *
>
> The company, after careful consideration, is of the opinion that the simplest and most effective method of now securing the required increase will be to abolish all transfer and exchange tickets and make a straight charge of 5 cents for each ride. By this means it is estimated the company's revenue will be increased by about $350,000 per month, an amount imperatively needed for the continued operation of the company. * * *
>
> Seven hundred and sixty million passengers or 76 per cent of all present passengers, will, it is estimated, be carried, without change of cars, for a 5-cent fare. These 5-cent passengers will not, therefore, be disturbed so as to lessen the number of short riders, in the encouragement and accommodation of which so much work on the part of both management and men has been expended.
>
> It is estimated that of the present 230,000,000 free transfer and 3-cent exchange passengers per annum 100,000,000 will no longer make use of this privilege for very short distances. They do so now simply because it can be done for little or no cost. If this estimate be correct there will thus be provided an added available car capacity equal to 100,000,000 passengers per annum for those passengers whose ride is of sufficient importance to justify the payment of a 5-cent fare.

Right-Hand Running Planned

A change in street traffic to operate in accordance with the right-hand rule in conformity with the rest of the continent is about to take place in the Province of British Columbia. Traffic in that province has always conformed to the English or left-hand rule. This is believed to have increased accidents and decreased automobile traffic from outside the province. There are no large cities in the province except Vancouver and Victoria. These and the neighboring communities of New Westminster and North Vancouver are the only ones with electric railway systems, except that in Nelson there is a small road which operates two cars.

The railways and other electrical utilities in Vancouver, Victoria, New Westminster and North Vancouver are operated by the British Columbia Electric Railway. The work of making this change will, therefore, be entirely a matter of the cost of changing the electric railway systems. The province has been divided into two parts separated by a range of mountains over which there is no road communication. The right-hand rule went into effect on July 15 in the interior of the province. It will not go into effect in that part occupied by the cities named until a date yet to be decided. This will depend upon the time required for changing the special work and switches and rearranging the car platforms.

Estimates of the cost of the change to the railway range from $1,000,000 to $1,500,000. The allocation of this cost has not been decided, but the British Columbia Electric Railway contends that the provincial government should assume part of the cost inasmuch as the railway built its system in conformity to the road regulations which are now being changed at the request of the people.

Norfolk Report and Valuation Completed

A. Merritt Taylor and his associate, Charles B. Cooke, Jr., have completed their report on the Norfolk street railway problem. Mr. Taylor has filed the report together with his recommendations, with the Norfolk Public Utilities Commission. This report was made at the instance of the city. Its purpose is to develop and define the respective rights and obligations of the city and of the Virginia Railway & Power Company. It includes a valuation of the company's property, a complete plan for the rehabilitation and extension of the company's property, definite recommendations with respect to rates of fare, and a complete outline of a recommended franchise which is designed to protect and advance the interests of the city and of the company and protect the capital invested in the public service.

It is understood that the report constitutes a very thorough treatise on all problems entering into valuation, rate making and franchise writing. It also discusses the jitney problem.

Because of Mr. Taylor's broad experience as a builder and operator of electric railway properties, as director of the Department of City Transit in Philadelphia, and as director of the Department of Housing & Transportation of the Emergency Fleet Corporation, where he had the responsibility of transportation to 180 shipyards, this report will be awaited with great interest by the electric railway industry. It will be published, it is understood, within a few days.

Echoes of the Denver Strike

A mass meeting was held in the Municipal Auditorium at Denver, Col., on Sept. 13 to argue the strike. It was really an indignation meeting of union labor. G. Y. Harry, federal mediator and member of the National Labor Board, supposed to be a non-partisan, showed in his talk that he was a labor man and pointed with pride to the fact that the head of the department he represented was a union man and that he (Harry) advocated the closed shop.

The strikers apparently have some big point in view to accomplish their work. This seems to be in the form of initiated petitions being circulated on Sept. 16, calling for a special election for municipal ownership of the Denver Tramway. One of the sponsors of the petition is Henry Silberg, executive of Tramway Local 746, who is now in jail.

William Thornton, vice-president of the Colorado State Federation of Labor; William J. O'Brien, former president of the Tramway Employees' Union, and Charles Ahlstrom, president of the Denver Trades and Labor Assembly, have been indicted by the Grand Jury for inciting to riot. F. W. Jefferay, local clothing merchant and persistent villifier of General Manager Hild of the tramway, for four years, has also been indicted for inciting and participating in riots.

Bay State Fares Up

Company Advances Rates to Meet $1,400,000 Additional Wage Payment —May Shut Down Lines

To secure sufficient revenue for the payment of increased wages to its employees, the Eastern Massachusetts Street Railway, Boston, planned to place a revised schedule of rates in effect on Sept. 15. At the same time the railway management announced that higher fares alone would prove inadequate, and that the only hope of continued operation lay in the practice of the strictest economy. It also notified its employees that it would begin at once a policy of laying off all men who could be spared.

WAGE INCREASE BRINGS CRISIS

The immediate cause of these measures was the award to the carmen of $1,400,000 in increased pay, discussed at length on page 562 of this issue. Even before the granting of the higher pay the railway was losing money on all but one of its divisions. The company operates over 750 miles of street railway lines running from the New Hampshire line on the north to Boston. On the south its lines extend from Quincy to the Rhode Island boundary. The principal cities affected are Lowell, Lawrence, Haverhill, Salem, Lynn, Peabody, Chelsea, Revere, Woburn, Melrose and Malden on the north of Boston and Brockton and Taunton on the south.

Under the new fare system free transfers are discontinued. The sixteen-ride ticket, selling for $1, is withdrawn, a fourteen-ride ticket selling at the same price taking its place. This ticket is good only for rides in more than one zone and in all cities and towns except Lynn, which is given a fifteen-ride ticket for $1. Fares between Boston and Revere and between Lynn and Peabody are raised from 10 cents to 15 cents, while the fare between Boston and Lynn is advanced from 25 to 30 cents. The ten-ride ticket between Lynn and Boston is replaced by an eight-ride ticket selling at $1.50, the price remaining unchanged. Zones are also shortened in a number of cases.

NO RISE IN FALL RIVER

Fall River will be the only city served by the company which will not be affected in any way by the new schedule. Fares there will stay at the old figure because the district is earning its cost of service according to the public control act under which the road is operated. Each month has shown receipts enough to cover all expenses and leave a surplus. Homer Loring, chairman of the trustees, said yesterday that he attributed the success of the road in that district to public cooperation and particularly to the work of the home rule committee, headed by James Tansy, president of the Fall River Textile Council.

With regard to the possibility that the railway might be forced to discontinue a number of its lines if the revenue were not increased, an official of the company said:

> Following every increase in fares traffic has fallen off. We do not anticipate any falling off now, but if the lines are found not to be supporting, it is probable that they will have to be lopped off and service discontinued.

The railway management on Sept. 13 summoned the joint conference board, representing the carmen, and announced that it would begin at once a policy of rigid economy embracing a more extended use of one-man cars and the laying off of many employees. The company's labor's committee reported that the joint board promised co-operation of the workers in cutting expenses and realized they would have to expect a weeding out of employees who could be dispensed with, if the rest of the men were to hold their jobs at increased pay. It was Manager Fritch who announced that the curtailing of the working force would be so regulated that it would not in any way cripple the service.

Louisville Fares Await Election

There have been no developments of real interest lately in the fight of the Louisville (Ky.) Railway for higher fares. The "service-at-cost" plan of the Round Table Club apparently didn't get anywhere. The ordinance of the railway before the City Council was withdrawn. The various civic clubs, especially the smaller suburban ones, are voting pretty freely against any increases. The Board of Trade has again taken up a discussion of the matter.

Politics and the fall election have some considerable bearing on the matter. A member of the City Council, in discussing the increase on Sept. 10 with the representative of the ELECTRIC RAILWAY JOURNAL at Louisville, said:

> The company must have an increase. I'm for it, and a lot of the other members are. However, there will be no service-at-cost plan. If there is any advance in fares it will be a flat increase, probably for one or two years, or under an agreement that the Council may renew the option at the end of one or two years. However, there isn't going to be anything done in the matter until after election. Everyone is sparring for time in the interval.

The man who made this statement is one of the best posted and shrewdest men in the Council. The slow progress that is being made bears out this statement.

Six-Cent Fare Stands

The State Board of Public Utilities Commissioners has issued an order authorizing the Hudson & Manhattan Railroad, N. Y., to continue to collect a 6-cent fare between points in Hudson County, New Jersey. The company is required to refund 1 cent upon arrival at the point of destination, and to extend the time for redemption of excess fare tickets from ten minutes to one-half hour. The company was recently authorized by the Interstate Commerce Commission to raise its fare between New Jersey and downtown New York to 6 cents.

Bus Compromise Likely

Seattle May Allow Jitneys to Operate on Some Routes—Drivers Offer to Pay City

An ordinance recently drafted by Corporation Counsel Walter F. Meier of Seattle, Wash., and transmitted to the City Council, provides new jitney regulations that would mean a compromise between the present jitney ordinance and complete ban of buses from the city streets. The bill provides for the creation of an area in the business district, in which section no jitneys would be permitted to operate.

RESTRICTIONS SUGGESTED

To operate in districts outside the area, jitney drivers would be compelled to file applications for permits with the city comptroller, specifying the routes, terminals, schedules and rates of fare desired, and such permits would then be automatically granted by the comptroller without reference to the Council. The proposed bill, if adopted by the Council, would have to be submitted to the voters at the municipal election next March, as an alternative measure to the jitney initiative measure, which would permit jitneys to operate without city restrictions in any part of the city.

It also offers an alternative to the proposed ordinance which is to be considered soon by the utilities committee of the Council. This would entirely ban jitneys from operating within the corporate limits of the city. The new bill does not stipulate any rate of fare to be charged for jitney transportation, as is provided in the present regulations, since the city was enjoined from enforcing that part of the present ordinance by a decision rendered in the Federal Court. The bill provides, however, that persons operating jitneys must first obtain a permit from the city comptroller, and such permit must be posted on the front side of the machine's windshield. It would then be unlawful for any jitney driver to charge a fare other than that specified by the permit, or to operate over any routes other than that specified. It also provides that all buses will be subject to inspection by the Department of Public Utilities.

CASE BEFORE COURT

The State Supreme Court has taken under advisement the case of the Seattle jitney interests' suit to prevent the King County Superior Court from vacating the temporary injunction under which jitneys are now operating in Seattle. Decision in the matter was deferred after hearing the arguments of Assistant Corporation Counsel George A. Meagher, representing the city, and W. R. Crawford, representing the jitney interests.

The attorney for the jitney drivers has made a tentative offer to the city utilities committee to pay ½ cent to the city for every passenger carried into or out of the business district by the jitney buses.

Winnipeg Fares Up

Granting of Seven-Cent Rate by the Manitoba Commission Rounds Out Rehabilitation Program

Seven cents became the cash fare on the city lines of the Winnipeg (Man.) Electric Railway on Sept. 1. Four adults' tickets and seven children's tickets are sold for 25 cents. The sale of workmen's tickets at reduced rates has been discontinued. Fares on the company's suburban lines are raised approximately 25 per cent. The fare on the Winnipeg local lines was formerly 6 cents.

These increases were authorized by the Manitoba Public Utilities Commission in a judgment handed down on Aug. 23. During the past two years the commission has conducted an elaborate and thorough appraisal of the company's property, which it has valued at $24,369,431. The commission fixed 8 per cent as constituting a fair return on the investment. The commission further points out that the new fares will provide surplus funds for contingencies.

MANY OBSTACLES OVERCOME

This decision of the commission marks the successful close of a vigorous and consistent effort to put the Winnipeg Electric Railway on its feet, lasting since October, 1917, when A. W. McLimont took charge of the property as vice-president and general manager. At that time jitneys were on the street, making inroads into the company's revenues to the extent of $1,000,000 a year. Traction fares were the same as those set in the original franchise, averaging 3.85 cents for each revenue passenger. Public opinion toward the company was not of the friendliest, while labor troubles were a continuous menace.

In the winter of 1917 Mr. McLimont conducted a campaign against the jitneys which resulted in their complete elimination from the streets in April of the following year. Incidentally he accomplished reforms in the matter of service, such as the inauguration of the skip-stop system, re-routing and other improvements which resulted in the revenue per car mile being increased very appreciably.

COMMISSION GRANTS RELIEF

Four months after the elimination of the jitneys the company petitioned for increased fares. An interim increase was granted. The commission decided to make an appraisal of the company's property in order to fix a fare "which will produce revenue sufficient to cover operating costs and insure a fair return being paid those whose money is in the property." Twelve months later, in October, 1919, while the appraisal was still being made, the company was granted a further increase to 6 cents cash fares, with reduced rate tickets. Now comes the 7-cent fare with the elimination of all but two classes of tickets and the assurance from the commission that these fares will be sufficient to permit adequate service being given, to keep the road in first class condition and to provide a return of 8 per cent.

Starting in the spring of 1918 the company embarked on a program to rehabilitate the rolling stock. The cars have been equipped with new motors, front and rear exits, and other improvements which make for more economical operation. Forty new cars have been purchased, thirty of which are now in operation. A sum of approximately $1,000,000 has been applied during the past three years to this rehabilitation program.

Will Bar New Haven Buses

An ordinance has been passed by the Board of Aldermen of New Haven, Conn., ruling motor buses off a number of streets in that city served by the Connecticut Company. The measure is similar to the one adopted recently by the city authorities of Bridgeport, and designates eleven streets in the central area of New Haven from which the jitneys will be barred. It is provided that all persons operating public service motor vehicles, while carrying passengers, "shall keep in the traffic route fixed in the ordinance."

Any person, firm, or corporation violating any of the provisions of the measure shall pay a fine of not more than $100 for each offence. The bus men have announced their intention of fighting the measure in the courts. They claim that it is unconstitutional in that it was not given a public hearing prior to its passage.

The subject of bus regulation originally came before the board as a result of a letter from Lucius S. Storrs, president of the Connecticut Company, to Mayor Fitzgerald. Mr. Storrs declared that the company might have to suspend service on its New Haven division if jitney competition were not curtailed. The Mayor sent this letter and a communication of his own, urging immediate consideration of the emergency, to the Aldermen. The jitney men contend that enforcement of the new measure would put them out of business and give the trolley company a monopoly.

Eight-Cent Fare in Geneva

The Public Service Commission for the Second District of New York has authorized the Geneva, Seneca Falls & Auburn Railroad, Seneca Falls, to charge a fare of 8 cents in Geneva including that part of the interurban line, city line to Lake road, and 8 cents in each of the existing zones. Commutation and school fares and chartered car rates remain unchanged. Book tickets may be sold as heretofore but on the basis of 7 cents for each zone involved. The new fare rates are effective for a year from Sept. 1 and thereafter until otherwise ordered by the commission. The fare on the company's line in Geneva has been 6 cents.

Ten-Cent Fare Needed

President Kealy Tells State Commission Why Kansas City Lines Must Have More Revenue

Officials of the Kansas City, Mo., Railways appeared before the Missouri Public Service Commission on Sept. 8 at a hearing on the petition of the company for a further increase in fare. The railway recently applied to the commission for permission to install a sliding fare system, based on the service-at-cost principle. Under the proposed plan the fare would advance to 9 cents or possibly to 10 cents cash, with three tickets for 25 cents. The fare is now 8 cents straight.

OFFICE WORKERS DEMAND SPEED

Phillip J. Kealy, president of the railway, in discussing the new plan before the commission, declared that a 10-cent fare would eliminate the inconvenience to the public of "making change." Mr. Kealy said that the dislike on the part of the public to make change was one reason why people were willing to pay 10 cents to ride in a jitney when they could ride at less cost in an electric car. He contended that a greater part of the jitney patrons were clerks and stenographers, to whom a saving by cheaper fare might mean more than to the more mature persons who almost uniformly use the street cars.

In discussing the jitneys, Mr. Kealy declared "that a rain during the rush hour was worth $1,500 to the company any day." He said, however, that this extra patronage drawn from the jitneys often came unexpectedly and caused complaint because the railway had not foreseen that sudden showers would demand more street cars downtown. He did not believe that a 10-cent fare would increase jitney riding. He added that he believed that the use of private cars would be curtailed somewhat in the next few months.

Bus competition is largely responsible for the company's present plight. On fair days, said Mr. Kealy, the jitnews haul about 42,000 persons. Without jitney competition, he said, the company almost would have earned its interest charges in the period between January and June. He said that in Kansas City the joint business of the electric railway and of its jitney rivals was growing about 4 per cent a year, despite the thousands of privately owned cars. However, because of the jitneys, he said that the company was carrying from 3 per cent to 7 per cent fewer passengers than under the 5-cent fare.

PASSENGER COST 6.96 CENTS

A cash fare of 10 cents, with tickets selling at three for a quarter, would bring the railway an average of $8\frac{4}{10}$ cents from each passenger, according to Mr. Kealy. He pointed out that without taking into consideration any return on investment, the cost of carrying a passenger had increased from 3.6 cents to 6.96 cents.

No Opposition to Freight Increase

The petition of the Connecticut Company to the Public Utilities Commission for an increase of 40 per cent in its tariffs on all classes of freight was heard in the offices of the commission in Hartford on Sept. 16. The company wants a higher rate for freight on all sections of its lines except the New London Division. Victor S. Curtis, secretary of the company, and S. W. Baldwin, attorney for the company, presented the company's side of the case. No one appeared to oppose the granting of the increase. The company produced figures for the period from July, 1919, to June, 1920, showing that the trolley express service had been run at a loss. The commission probably will not decide for several days.

Ten Killed in Interurban Crash

Ten persons were killed and 100 others were injured, several of them fatally, when two interurban electric cars of the Denver & Interurban Railroad met in a headon collision on Sept. 6. The accident occurred near Globeville, Col., a Denver suburb. Failure on the part of the motorman of one of the cars to obey dispatchers' orders is said to have been the cause of the accident. Among those killed was Judge R. S. Morrison, pioneer resident of Denver and a recognized authority on mining law.

Transportation News Notes

Ten Cents on Newport Line.—The Bay State Street Railway, Providence, R. I., has raised the fare on its Bay State line from 8 cents to 10 cents. The company operates between Newport and the Massachusetts State line.

Twelve Cents on Interurban.—The Lawton Railway & Lighting Company, Lawton, Okla., has been granted authority to increase fares between Lawton and Fort Sill from 10 cents to 12 cents. The new rate took effect on Sept. 1.

Seven Cents in Each Zone.—Under authority of an order issued by the State Public Utilities Commission, the Western Virginia Traction & Electric Company, Wheeling, W. Va., has raised the fare in each of the four zones between Elm Grove, W. Va., and West Alexander, Pa., from 6 cents to 7 cents. The fare between Wheeling and Elm Grove remains at 10 cents. The total charge between Wheeling and West Alexander is raised from 34 cents to 38 cents.

Would Raise Spartanburg Fares.—George B. Tripp, vice-president and general manager of the South Carolina Light, Power & Railways Company, Spartanburg, S. C., recently asked the Spartanburg City Council to allow the company to raise its fare from 7 cents to 10 cents. Mr. Tripp also asked that the company be relieved of street paving, which under the franchise it is obliged to do. The company seeks also to be excused from extending its lines to Whitney and Clifton Streets.

Utah Interurban Wants More.—A petition was recently filed with the Utah Public Utilities Commission by the Utah-Idaho Central railroad, Ogden, requesting permission to increase its minimum charges between stations 5 cents for one-way and 10 cents for round-trip fares, making a minimum of 10 cents for one-way and 20 cents for round-trip rates. The change would affect about fifty stations in Weber, Boxelder and Cache counties. The company operates 137 miles of electric line.

Eight Cents in Muskogee.—The Muskogee (Okla.) Electric Traction Company has been authorized by the State Corporation Commission to charge an 8-cent cash fare on its city lines. The company is directed to sell two tickets for 15 cents and fourteen for $1. The new rates are to become effective at once. School children are to be allowed to buy twenty-five tickets for $1. Fares between Muskogee and Hyde Park are to be 15 cents each, and the line to Fort Gibson, is to be divided to five zones in each of which the fare is to be 8 cents.

Rate Interference Enjoined.—A temporary injunction has been issued by Circuit Judge Stout restraining the Kentucky Railroad Commission from interferring with the collection of rates now being charged by the Louisville & Interurban Railroad, Louisville. The company raised its fares on Sept. 1 without consulting the commission. The latter thereupon instructed the State Attorney General to take steps to prosecute the railway on the ground that it had violated the terms of an order issued by the commission a year ago fixing the fare to be charged.

Hearings on Scranton Plea.—Milton J. Brecht, a member of the Pennsylvania Public Service Commission, recently heard the petition of the Scranton Railway for permission to raise its fare to 10 cents. Counsel for the city of Scranton contended that although the company needs an increase in fare to meet obligations and to overcome a deficit a dividend was declared last winter when the railway deferred maintenance work, amounting to approximately $300,000. It was also claimed that last year the company carried more passengers than in any other previous single year and that some of the earnings from this source had been used to pay dividends.

Cars Collide; Five Persons Killed.—In a head-on collision on Sept. 5 on the Fairview line of the Monongahela Valley Traction Company at Baxter, W. Va., five persons were killed and about twenty-five injured. A passenger car bound from Fairview to Fairmont collided with a freight electric train heavily loaded. The freight train had followed a passenger car out from Fairmont and was scheduled to pass the passenger car bound from Fairview to Fairmont. The passenger car passed and instead of waiting in the switch for the freight train, which was signaled, the passenger car started toward Fairmont, and about a half-mile out the collision occurred.

Interurban Rise Postponed.—F. E. Connor, vice-president of the Spokane & Eastern Railway & Power Company, successor to the Spokane & Inland Empire Railroad, Spokane, Wash., has received notice from the State Public Service Commission that the company will be allowed to increase its interurban rates by 20 per cent beginning Sept. 26. The increase will be made to place the company on a par with the steam roads which received a similar increase recently from the Interstate Commerce Commission. The railway advanced its freight rates on Aug. 26. Mr. Connor has announced that simultaneously with the advance in passenger fares, the pay of the carmen in the company's employ will be substantially increased.

May Raise Syracuse Rate.—An increase in the fare charged on the Syracuse lines of the New York State Railways is likely in the near future. Mayor Farmer of Syracuse sometime ago appointed a committee of citizens to recommend measures of relief for the local system. The committee engaged the firm of Ford, Bacon & Davis, to investigate the local railway situation. In their report, which has just been submitted to the committee and which will now be placed in the hands of the Mayor, the engineers favor adoption of a service-at-cost plan for the Syracuse lines. If the city enters into a service-at-cost agreement with the company, the latter will make a number of improvements in its local service.

Will Hear Los Angeles Petition.—A hearing on the application of the Los Angeles (Cal.) Railway for an increase in fare will be conducted by the California Railway Commission in Los Angeles on Sept. 20. It is expected that one day will be sufficient for the railway to set forth its need for increased revenue. The commission is familiar with the affairs of the company due to the thorough survey made last year which resulted in the rerouting of the entire system last May and the establishment of safety-car service on some lines. The city has announced that it will ask a continuance of the case after the railway has presented its side so that the statements may be investigated. The Business Men's Co-operative Association, an organization of merchants, has announced that it favors an increase of fare, provided the new rate does not exceed 7 cents. The Los Angeles Railway is charging a 5-cent fare. The application for an increase does not ask a specific rate. The commission is asked to authorize what it considers a just and necessary fare to make income meet operating expense.

Personal Mention

F. C. Niles, Receiver

Temporary Representative of Court for Kansas City Railways a Successful Merchant of Broad Vision

Frank C. Niles, recently appointed temporary receiver of the Kansas City (Mo.) Railways by Judge Kimbrough Stone of the federal court, is an example of the quiet civic worker and high type of business man who comes into prominence only when matters are put up to him. He has never sought publicity, yet is known in Kansas City as an exceedingly efficient man, capable of carrying through any civic project for which he assumes responsibility.

Mr. Niles was born in Waymart, Wayne County, Pa., Oct. 21, 1858, the son of Frank Niles, a country physician. He started his business career at sixteen as a school teacher. One year later he took over the management of a country store in that section and ran it for three years. When he was between nineteen and twenty he went West and settled in St. Paul, Minn. For about ten years he traveled for a grocery and cigar house. Later he went to Kansas and traveled for the H. C. Fischer Company, Chicago. He was also on the road for a time for Rothenberg & Schloss when they were located in Leavenworth, Kan. In 1899 he went into business for himself and established a wholesale cigar business in St. Joseph, Mo., under the firm name of the Niles & Moser Cigar Company. Six months later the firm moved its headquarters to Kansas City. It is now one of the largest jobbing houses of its kind in the Middle West.

He was named one of the original city directors of the Kansas City Railways and was reappointed to that office in July, 1916. His appointment as temporary receiver met with the approval of R. J. Higgins, attorney for the railway; Arthur Miller, counsel for the Kansas City Refining Company, which initiated the receivership proceedings, and Henry R. Platt, Chicago, representing the bondholders' protective committee.

Otis Gerke has been appointed auditor of the Eastern Wisconsin Electric Company, Sheboygan, Wis. Mr. Gerke was formerly assistant to the auditor of the company.

A. E. Harvey, chief engineer of the Kansas City (Mo.) Railways, has been appointed a member of a National Committee on Employment of the American Association of Engineers.

J. A. Beard has been appointed general manager of the Richmond & Fairfield Electric Railway. The company is the successor to the Richmond & Seven Pines Railway.

C. D. Purkhiser has been appointed receiver of the Caldwell Idaho Traction Company. Mr. Purkhiser was formerly assistant general manager of the company.

B. McGinnis has been appointed master mechanic of the Albany Southern Railroad, Albany, N. Y. Mr. McGinnis was formerly general foreman of the company.

Dennis J. Cullinan has resigned as track foreman of the Bangor Railway & Electric Company, Bangor, Maine, after spending twenty years in the service of the company.

R. S. Reading has been appointed electrical engineer of the Galveston (Texas) Electric Company, the Galveston-Houston Electric Railway and the Houston Electric Company.

Oscar E. Parish has been elected vice-president and treasurer of the Richmond & Fairfield Electric Railway, Richmond, Va., the successor to the Richmond & Seven Pines Railway.

J. C. Robbins has been appointed mechanical and electrical engineer of the Albany Southern Railroad, Albany, N. Y., succeeding George Osburn, who has been made general superintendent.

George Osburn has been appointed general superintendent of the Albany Southern Railroad, Albany, N. Y. Mr. Osburn was formerly the chemical and electrical superintendent of the company.

E. P. Williams, assistant treasurer of the Baton Rouge (La.) Electric Company, has resigned to accept a position as assistant comptroller of the Godchaux Sugars, Inc., with headquarters in New Orleans, La.

R. R. Randall has been appointed an assistant engineer on the staff of the Federal Power Commission. Mr. Randall has been in immediate charge of water-power matters for the United States Forest Service.

J. C. Lamb has succeeded W. R. Bell as commercial agent of the Baton Rouge (La.) Electric Company. Mr. Lamb has for some years past been in the commercial department of the Tampa (Fla.) Electric Company.

H. C. Pressler has succeeded J. E. Gallaher as master mechanic of the Eastern Texas Electric Company, Beaumont, Texas. Mr. Pressler was formerly general carhouse foreman of the Galveston Electric Company.

J. V. Sutton has been appointed chief claim agent of the Southern Public Utilities Company, the Southern Power Company, and the Piedmont & Northern Railway, Charlotte, N. C. Mr. Sutton was formerly connected with the claim department of the Southern Railway.

William E. Blodgett, secretary-treasurer of the Utah Light & Traction Company, Salt Lake City, Utah, has been appointed comptroller of the Winnipeg (Man.) Electric Railway. Mr. Blodgett has been connected with the Salt Lake City company for several years.

Oliver J. Sands has been elected president of the Richmond & Fairfield Electric Railway, Richmond, Va., the successor to the Richmond & Seven Pines Railway. Mr. Sands, a Richmond banker, recently purchased the road, which is 8 miles in length, from the United States Housing Corporation.

Col. Bion J. Arnold, consulting engineer of Chicago, Ill., has been retained by the Hydro-Electric Power Commission of Ontario to make a report on the cost, earnings and operating expenses of the radial lines which it is the intention of the commission to construct in the near future.

Harry E. Gough, superintendent of generation of the Elmira Water, Light & Railroad Company, Elmira, N. Y., has been appointed assistant to the general manager. Mr. Gough will also act as superintendent of electric construction and as superintendent of the electric meter department.

J. L. Longino has been appointed manager of the Pine Bluff Company, Pine Bluff, Ark., which operates the electric railway system in that city. Mr. Longino succeeds J. A. Whitlow, who will in the future devote his entire attention to his duties with the Arkansas Light & Power Company.

Harry B. Cleveland has been elected secretary and treasurer of the Elmira Water, Light & Railroad Company, Elmira, N. Y., succeeding C. A. Kolstad. Mr. Cleveland, who was at one time auditor of the company, has been for a number of years an expert accountant with the New York State Tax Commission.

Emil Schroeder has been appointed superintendent of the Norwood Division of the Eastern Massachusetts Street Railway, Boston. The division, which has just been established, includes the company's Norwood & Walpole lines. Mr. Schroeder has been in the employ of the Eastern Massachusetts system for several years.

Edwin Gruhl has been chosen a vice-president of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis. Mr. Gruhl's election to this position follows quite naturally his assumption of the duties of a vice-president of the North American Company, New York, N. Y., which controls the Milwaukee system.

W. H. Flury has been appointed a division superintendent of the Georgia Railway & Power Company, Atlanta, Ga., to succeed R. W. George, resigned. Mr. Flury was formerly a car starter. He has been connected with the company and its predecessors since 1898. Since that time he has filled the positions of conductor, motorman, instructor, complaint investigator and starter.

James B. Neal, a motorman in the employ of the Boston (Mass.) Elevated Railway, has retired on a pension after fifty-two years of service with the Boston street railway system. Mr. Neal is known to thousands of patrons of the elevated lines as a special officer during the rush hours at the Copley Square and Massachusetts Avenue station in the Bolyston Street subway. He was a driver in the old horse car days.

Alfred C. Jordan, superintendent of equipment and distribution of the Elmira Water, Light & Railroad Company, Elmira, N. Y., will also assume the duties of superintendent of generation of the company. Mr. Jordan will have charge of the operation of the power house and all substations. He succeeds Harry E. Gough, who has been appointed assistant to the general manager.

Otto Gottschalk has been appointed engineer of railway equipment of the Havana Electric Railway, Light & Power Company, Havana, Cuba. Mr. Gottschalk was formerly master mechanic of the Richmond Light & Railroad Company, Richmond Borough, New York City. Before joining that company two years ago he was assistant superintendent of electrical equipment of the Interborough Rapid Transit Company.

W. O. Clure, general passenger agent of the Twin City Rapid Transit Company, Minneapolis, Minn., was severely injured on Sept. 6 when he stepped into an open elevator shaft, falling twelve feet. Mr. Clure is now in a Minneapolis hospital with a fractured pelvis, a fractured left wrist and a compound fracture of the elbow. The accident occurred at the general office building of the railway at Hennepin Avenue and Eleventh Street, Minneapolis.

William B. Graham, formerly superintendent of the Southern Division of the Public Service Railway, Newark, N. J., who has been appointed a member of the staff of N. W. Bolen, general superintendent, with headquarters at Newark, has been presented with a gold watch by carmen of the Camden local, No. 180, Amalgamated Association of Street & Electric Railway Employees of America. The presentation was made at a farewell reception to Mr. Graham held at the Camden carhouse.

Charles Whiting Baker, who was editor-in-chief of *Engineering News* from 1895 to 1917, and has been consulting editor of *Engineering News-Record* for the past three years, announces his retirement from engineering journalism to organize the Engineering Business Exchange. The headquarters of the Exchange will be at 30 Church Street, New York City; and its purpose is to bring together those desiring to sell any sound engineering or technical business, manufacturing, constructing, selling or professional, and those who seek opportunities to purchase. Appraisals of such enterprises and similar allied work will be conducted by the Exchange.

David H. Goodwillie, City Service Director of Toledo, Ohio, whose name has figured prominently in the controversy between the city and the Toledo Railways & Light Company, has resigned. Mr. Goodwillie has accepted a position with the Edward Ford Plate Glass Company, Rossford, Ohio. He has been Service Director since January, 1916. During his tenure of office he has been active in working out the valuation of the properties of the Toledo Railways & Light Company. He was the chairman of a committee of three which set the $8,000,000 valuation on the Rail-Light property.

Obituary

E. A. Maher, Sr., Dead

Former President Third Avenue Railway Was a Pioneer in Electric Traction and Lighting Fields

Edward A. Maher, Sr., formerly president of the Third Avenue Railway, New York, N. Y., died at his home in New York City on Sept. 13. Mr. Maher was seventy-two years old. He retired from the presidency of the Third Avenue system two years ago.

Mr. Maher's connection with the Third Avenue Railway began nearly thirty years ago. In May, 1917, when he was vice-president of the company, he completed twenty-five years of service with the railway. The unexpected death of F. W. Whitridge, then president of the railway, changed Mr. Maher's plan to retire and he was elected president. He resigned in the following year, however, after being actively engaged in business for more than fifty years. His son, Edward A. Maher, Jr., was formerly vice-president and general manager of the company.

Mr. Maher was born in Albany, N. Y. He was graduated from the State Normal School and then entered politics, being elected president of the Board of Supervisors of Albany County at the age of twenty-three years. He also served as a member of the New York Assembly and as Mayor of Albany in 1888 and 1889. Upon the expiration of his term as Mayor he was made president and general manager of the Albany Electric Illuminating Company.

In 1892 Mr. Maher became president of the Union Railway, New York City. When the Third Avenue Railway acquired the Union Railway's properties, Mr. Maher was retained as president and general manager of one of the subsidiary lines. He was appointed general manager of the Third Avenue Railway in 1908 and later was elected vice-president in addition. Three years ago he became president.

A. L. Neereamer Dead

Secretary of Central Electric Railway Association Dies Suddenly Following Stroke of Apoplexy

Albert L. Neereamer, secretary-treasurer of the Central Electric Railway Association for the last twelve years, died at his home in the city of Indianapolis on Friday evening, Sept. 10, following a stroke of apoplexy. Mr Neereamer had left his office shortly after 4 o'clock, and death came almost instantly while he was walking in his garden at the rear of his home.

Deep regret at the death of Mr. Neereamer was expressed by officials of the various electric railway systems operating out of Indianapolis. Robert I. Todd, president of the Indianapolis Street Railway and president of the Central Electric Railway Association, said:

> In the death of Mr. Neereamer the interurban railways of the Middle West suffer a signal loss. Realizing the advantages of an organization which would unite and coordinate the mutual interests of the electric railways in the States of Indiana, Illinois, Ohio, Michigan, Kentucky and the northern part of West Virginia, the Central Electric Railway Association was organized some twelve years ago. Mr. Neereamer was elected secretary and treasurer soon after the association was organized and filled that position continuously up to the date of his death. His genial personality and splendid executive ability contributed largely to the building up of the association. At its inception twelve years ago the association included only a few electric lines with a very small membership, while at the present time there are sixty-six interurban railways with a total of 5.238 miles.
>
> Mr. Neereamer also acted as chairman of the Central Traffic Association and helped materially in the compilation of joint passenger and freight tariffs, and the inauguration of the present interchangeable coupon mileage books.
>
> He enjoyed the esteem and confidence of the officers and employees of the various electric railways, who keenly feel his loss. It might well be said of Mr. Neereamer that "none knew him but to love him, or named him but to praise."

To his work for the association Mr. Neereamer brought experience in steam railroad, accounting and traffic handling. Almost single-handedly he took care of all the mass of routine, correspondence and study which was represented but not seen in the finished product. It was his undaunted spirit and that of a few others which carried the association successfully through the early period of its establishment.

Mr. Neereamer was fifty-six years old. Previous to taking up residence in Indianapolis he was general superintendent and traffic manager of the Columbus, Delaware & Marion Railway. He started his railroad career as a machinist apprentice in the shops of the Hocking Valley Railroad at Columbus, Ohio. He was later an engineer on this road. Mr. Neereamer then spent about three years in civil engineering work, and later became connected with the auditing department of the Hocking Valley and traffic department of the Columbus, Sandusky & Hocking Railway.

Mr. Neereamer was very active in Masonic affairs. He was a member of the Scottish Rite, of the Mystic Shrine and of the local Shrine Gatling Gun Squad Mr. Neereamer is survived by his wife and a brother.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Raw Material Retarding Production of Electric Heaters

Shipments of Porcelain and Steel Are Slow—Prices Firm at Present—Labor Conditions Improved

Orders for electric railway heaters this season have not been up to the standard of other years, manufacturers report. Foreign inquiries are increasing, but the number of actual orders from abroad is light. The buying of heater repair parts, on the other hand, has been fully as large as in past years and perhaps even somewhat in excess of other seasons. The financial condition of many traction companies has resulted in fewer additions than usual being made to rolling stock and as a consequence the buying of new heaters has suffered.

This circumstance has been more than counteracted, however, by unfavorable conditions of production which manufacturers have met in respect to raw material. In an article which appeared in the April 3, 1920, issue of ELECTRIC RAILWAY JOURNAL deliveries were said to be lengthening and attention was called to the need of railways ordering heaters during the spring for use in the coming winter. Shipments of hollow ware and porcelain at that time were difficult to obtain under six to eight months. Several railways which heeded these conditions and ordered during April report that they are congratulating themselves upon receiving shipments in good time. Manufacturers seem to think there are still many traction companies which have neglected to order needed repair parts and heaters for this winter's equipment. If companies whose needs are not so pressing but which are anticipating future requirements should also dump their orders upon the manufacturer this fall, considerable delay and congestion may be expected to result.

CONDITIONS SLIGHTLY IMPROVED

Manufacturing conditions show some improvement over last spring. There is still much room for further betterment, however. The prices of raw material are now fairly steady compared with early summer, but are much higher than last year at this time. Porcelain plants are swamped with orders and the best shipments of this material that are promised range from three to four months, manufacturers report. Wire for resistance coils is reported in good shape as to shipments, but no reduction in price is expected for some time. Deliveries of steel are very slow, and the items that are used in heaters, such as sheets, clips, screws, fastenings, etc., are especially scarce. If this class of material is purchased from local stocks to cover rush orders premium prices are demanded and the material is not uniform. Transportation is easing up compared with the situation last spring, but the improvement on shipments of goods used by heater manufacturers has not been commensurate with other material.

Labor is now in greater supply, and a better class of workmen is said to be available. The production per man is also increasing. Prices of heaters are fairly firm at present and no fluctuation is apparently anticipated in the immediate future. Manufacturers state that in view of existing conditions traction companies should begin to take stock of their future needs for heaters and parts, with a view toward ordering their 1921 supplies by April for shipment next August or September.

Car Shortage to Blame for Wood Pole Tieup

Deliveries Slow in Spite of Sizeable Stocks at Storage Yards and Producing Points—Prices Show an Upward Tendency

Little improvement is evident in the transportation situation as it affects the wood pole supply, according to representative producers, for shortage of cars is still the main difficulty in filling orders promptly. Demand is holding up as strongly as it has been for some months. In some quarters the effect of the higher rates accorded to steam railroads is felt in heavier orders from them, and still other producers, who have not felt the increased buying yet, are anticipating it. Traction companies are not ordering heavily at present, it is stated.

Here in the East there is a considerable shortage, but at the producing points in the West fairly good stocks have accumulated, awaiting cars to carry away the poles. One of the large companies also reports good stocks at its storage yards in the Middle West, but another states that its supplies there are broken. Deliveries can be made from these storage points in from 4 to 6 weeks it is stated, while shipments from the Far West in general require from two to three months to reach the Atlantic seaboard. One of the largest pole consumers is sending out personal tracers in an effort to facilitate the movement of cars of poles. The unfavorable weather conditions last winter, when the lack of snow in the West hindered the work of getting out poles, is one of the factors to blame for present conditions.

In spite of the accumulation of back orders and the slowness of deliveries few cancellations have apparently been made. Hope is held out that if transportation continues to improve, all shortage of cedar poles will vanish. Chestnut poles, however, which have heretofore been in good supply, are now becoming more scarce. One reason for this is said to be the increasing difficulty of finding chestnut trees that are free from blight. The demand for yellow pine poles is reported as less than in other seasons. Stocks of these poles are rarely carried, and deliveries can be made in from two to four weeks.

Representative prices quoted on western red cedar poles, f.o.b. New York, are as follows: 30-ft. 7-in. top, $11.30; 35-ft. 7-in. top, $17.95; 40-ft. 7-in. top, $18.45; and 35-ft. 8-in. top, $18.95. Yellow pine poles, 30-ft. 7-in. top, can be bought for $7.50, and 35-ft. 7-in. top, $8.50. In one instance at least all prices on poles have recently been withdrawn, and higher prices seem to be generally expected as a result of the increased cost of transportation.

Insulated Wire Manufacturers Optimistic

Demand Slightly Less Now, but Big Market Seen Abroad—Transportation Improving

Manufacturers of insulated wire are very optimistic about the future of the business. Although in many quarters the demand is said to have fallen off recently, a good volume of business is still under way. A big market is looked for abroad, too, and the demand there, which several producers say has been rather off, seems to be picking up.

Reports on production vary. Some producers are turning out material considerably in advance of their normal output due to the strong demand which has existed. Other factories have been affected adversely by transportation and labor difficulties. The supply of raw cotton and copper is plentiful, but in spite of that the supplies reaching wire mills have in many cases not been adequate because of delays in delivery. The outlook in this respect is regarded as encouraging as the transportation tension has materially lessened within the last six weeks.

Rubber-covered wire appears to be in better supply than weatherproof.

Deliveries from the factory cover a wide range among different companies, some of which are in a position to deliver rubber-covered in two to four weeks. Other manufacturers who have had back orders pile up quote as long as ten weeks on this material. Shipments of weatherproof wire are somewhat slower and range as long as fifteen weeks. Manufacturers' stocks in general are very low. A few producers report fair supplies that are badly broken, while only in one or two cases are good stocks in existence.

Labor conditions do not seem as favorable with insulated wire manufacturers as in other branches of the electrical industry. Several producers report either that labor is scarce or that they are having strikes; or else the complaint is against current high wages. One of the large companies recently reduced prices on both insulated and weatherproof wire varying in amount according to size, but averaging in the main about 5 per cent. Inquiries reveal no further price changes on the part of other manufacturers, however. The general feeling seems to be that no immediate fluctuation is in sight. One or two express the view that any change in price will probably be upward because the new freight rates are expected to advance the price of copper. Weatherproof wire is quoted on 27 cents base and rubber-covered on 29 cents base.

Deliveries Improved on Pole Line Hardware

Better Transportation Is Easing the Situation—Demand Is Strong and Orders Are Still Behind

Although supplies of pole line hardware in general are still low, manufacturers are more hopeful regarding the situation because transportation has improved materially. Deliveries, which were running from three to five months only two months ago, are now being made in from eight to ten weeks, according to representative manufacturers. This improvement is primarily a result of the better transportation situation. Steel mills are turning out material in about the same volume as ever, but they are now able to ship the goods away much faster, and this is reflected in the improved deliveries that have been noted. Some producers of line hardware are still resorting to trucks to supplement freight shipments and this is also helping to relieve congestion, albeit increasing overhead expenses. Prices have thus far remained firm in spite of higher freight costs.

Demand is holding up as strongly as ever and a very active market is also reported from abroad. In fact, some manufacturers state that their foreign sales are even larger than their volume of domestic orders, and this of course has a direct bearing on the supply available for home consumption. Electric railways are still purchasing only for immediate needs. Stocks in general remain very low and manufacturers have not caught up with their back orders. In an effort to accomplish this, however, producers in some quarters are discouraging new buying it is reported, until they have caught up on filling orders. One of the largest distributers in the East recently received a couple of carloads of material and turned the goods over almost immediately. Word has just arrived from Chicago territory to the effect that new price lists on line hardware have been issued there amounting to an advance of about 5 per cent. According to this report, local jobbers' prices in that district on galvanized pole steps, $\frac{5}{8}$ in. x 9 in., are $92.51 per 1,000 in quantities of from 500 to 1,500 and $104.10 per 1,000 in lesser quantities. Galvanized machine bolts, $\frac{5}{8}$ in. x 10 in., are $13.99 per 100 in large quantities and $15.74 per 100 in small lots. No advance was recorded on cross-arm braces.

Rolling Stock

The Portsmouth (N. H.) Electric Railway states that it has purchased three large snow plows.

The Detroit (Mich.) United Railway is reported to have purchased fifteen safety cars on Sept. 15.

The Detroit (Mich.) Municipal Railway was expected to place an order for fifty safety cars on Sept. 18.

The Lincoln (Neb.) Traction Company announces that it expects to purchase one No. P-1021 McGuire-Cummings snow plow.

The Chicago (Ill.) Surface Lines have placed an order for ten safety cars with the J. G. Brill Company. It is reported that the order was placed on a thirty to forty days' delivery basis.

The Dallas (Tex.) Railway announces that delivery of four of the fifty new safety cars that have been ordered is expected about the middle of the month. All of the new cars will be in Dallas by Oct. 10, it is stated, and will be put in service at once.

The Pacific Electric Railway, Los Angeles, Cal., announces that eleven of the forty-nine new Birney type one-man safety cars recently ordered by the company as announced in the August 21 issue of ELECTRIC RAILWAY JOURNAL have arrived in Los Angeles and are to be promptly equipped and placed in service within thirty days from Sept. 9. The company does not intend to place any of the one-man cars on its city lines in Los Angeles. The eleven just received will be used to replace the heavier equipment now in use on the company's city lines in Long Beach. Twenty-one additional cars of the same type are now en route to Los Angeles and when received will be placed in local service in Pasadena and other smaller towns on the company's system. Twenty-five safety cars have already been in service for some time at outside points, and it was because of the efficient and economical showing of these cars that the additional equipment of this type was purchased. Delivery of the thirty large interurban all-steel type of cars now on order is expected by November 1, 1920. It is anticipated that with the addition of this new equipment much of the older equipment can be overhauled, thus permitting of a very decided improvement in the service on all the company's lines.

Track and Roadway

Alabama Power Company, Gadsden, Ala.—According to President T. W. Martin the Alabama Power Company will spend $100,000 on improvements on the system of the Gadsden Street Railway.

Lincoln (Neb.) Traction Company.—The Lincoln Traction Company within the next few months expects to rebuild the line to the State Penitentiary which was removed recently on account of the grading and paving of the roadway.

Pacific Electric Railway, Los Angeles, Cal.—The inspection trip over the lines of the Pacific Electric Railway has resulted in the approval by the legislative body of the concrete macadam pavement laid by the railway along its Santa Ana tracks.

Jacksonville (Fla.) Traction Company.—A movement has been started by the City Commission of Jacksonville to have the street line which at present runs to Eighth and Talleyrand Avenues extend to the municipal docks. The extension would be only a little over a half mile. Commissioner Acosta suggested that the city construct the line and that the Jacksonville Traction Company should operate it. According to the city attorney the city's charter will not permit the building of an electric line, and the question will be submitted to the Council.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The Public Utility Commission has approved the application of the Trenton & Mercer County Traction Corporation, Trenton, N. J., for the conveyance of a right-of-way to the borough of Princeton. The board also approved an application by the same company for the conveyance of the land to Princeton University. The traction company has changed its trolley terminus at Princeton that the university authorities might have additional land for a boulevard. The university agreed to furnish the land, buildings and all of the material for the construction of the new terminus.

Allen Street Railway, Nazareth, Pa.—The Allen Street Railway has just finished the erection of a steel trestle over a railroad crossing. This trestle replaces a wooden structure. The trestle was fabricated and erected by the Bethlehem Fabricators, Inc., and it was designed by R. T. Peppell.

Dallas-Wichita Falls Interurban Railway, Dallas, Tex.—The recent extension of the time within which to complete financial details of the building of the Dallas-Wichita Falls interurban line insures completion of the project, according to a telegram received by Wiley Blair of Dallas, Tex., chairman of the local interurban committee, from George Bishop of Cleveland, Ohio, who guaranteed to sell $5,000,000 of first mortgage bonds of the company. Mr. Bishop has sold $3,500,000 of the $5,000,000 issue, and has until Dec. 1, under the terms of the extension, in which to dispose of the remaining $1,500,000. Actual construction then must begin by March 1, 1921.

Dallas (Tex.) Railway.—The Dallas (Tex.) Railway will soon be asked by the City Commission to construct a new cross-town line, according to Hal Moseley, Commissioner of Streets. The proposed cross-town line will be operated in connection with the Masten Street extension now in course of construction, and will afford a means of rerouting cars that come into the business district from North Dallas and continue to South Dallas under the present plan of cross-town operation. These cars now make a loop of the business district before going to South Dallas, and under the plan now being worked out by Mr. Moseley, this downtown loop would be eliminated, effecting a saving of many car-miles for the traction company. While Richard Meriwether, vice-president and general manager of the railway, has not disclosed his plans, it is understood he contemplates the construction of a line on St. Paul from the Masten Street line to Commerce, thus affording a means of routing South Dallas cars out of Harwood Street.

Power Houses, Shops and Buildings

Lincoln (Neb.) Traction Company.—The Lincoln Traction Company is considering the purchase of new additional boilers for the power station and also coal-handling equipment.

Monongahela Valley Traction Company, Morgantown, W. Va. — The Monongahela Valley Traction Company has installed three new transformers at a cost of more than $10,000 at the Morgantown, W. Va., substation. Rights-of-way are being secured by the traction company for a new power line extension to Richard, W. Va., where a substation will be established.

Southern Pacific Company, Portland, Ore.—Plans have been approved for the new passenger station for the electric lines of the Southern Pacific Company at Portland. The new station will occupy the site of the old Lyric Theatre at Fourth and Stark Streets. The ground area is 50 ft. x 100 ft., and the arrangement will make it attractive in an architectual way, with ample room for the accommodation of traffic.

Trade Notes

Meters.—The Economy Electric Devices Company, Chicago, Ill., is distributing information in the form of a letter with enclosures, showing the work of its Economy Power Saving Meters in conserving current on electric cars.

Farrell-Cheek Steel Foundry Company, Sandusky, Ohio, manufacturer of small steel castings, announces that Julius Jones has been appointed its sales representative for the Cleveland district. Mr. Jones was formerly president of the Standard Steel Castings Company, Cleveland, Ohio.

The National Association of Purchasing Agents will hold its annual convention at Chicago on Oct. 11, 12 and 13. Business sessions will be held on each of these dates. Some of the speakers on the program are: Russell A. Pettengill, of the Russell A. Pettengill Company, Chicago; Professor Irving Fisher of Yale University, and Dr. F. W. Russe of Mallinckrodt Chemical Works, St. Louis, Mo. The members of the association now number 3,500.

The Economy Fuse & Manufacturing Cormpany, Chicago, Ill., announce that S. W. Fries has been appointed district sales manager for Kansas City territory, with offices at 1205 Commerce Building, Kansas City, Mo. Mr. Fries succeeds R. P. Crawley, who has resigned to take over the active management of the Crawley Electric Company of Peoria, Ill. Mr. Fries has had a long and wide acquaintance with the electrical field. He has been with Economy Fuse & Manufacturing Company for a number of years.

Fred W. Venton of the Railroad Sales Department of Crane Company, Chicago, was elected president of the Air Brake Appliance Association for the ensuing year, at the twenty-seventh annual convention of the Air Brake Association, recently held in conjunction with the Air Brake Appliance Association. Mr. Venton was formerly secretary of the association, which is composed of manufacturers throughout this country and Canada. He remains as secretary of the Railway Equipment Manufacturers' Association.

The Super Refined Metals Company of Detroit, Mich., will exhibit at its space, Booth No. 7, Association of Iron & Steel Electrical Engineers' Convention, Pennsylvania Hotel Roof, New York City, Sept. 20 to 23, inclusive, an automobile motor mounted on Kelly metal bearings. This motor will be run continuously without lubrication for five days. The Kelly process for super-refining and alloying non-ferrous metals has been perfected to such a degree that a uniform amalgamation is obtained. It is particularly suitable for use on electric railway car journals and many roads have used it with good results. The exhibit and demonstration should be interesting to railway men.

Ackley Brake and Supply Corporation, 50 Church Street, New York, N. Y., has appointed Walter H. Evans, McCormack Building, Chicago, Ill., as general Western agent for the sale of Ackley brakes and G. & B. mineral oil paint in the territory covered by Illinois, Michigan, Wisconsin, Minnesota, part of Indiana and the city of Toledo, Ohio. Mr. Evans was connected for a number of years with the Baltimore & Ohio Railroad. He first entered electric railway work with the Twin City Rapid Transit Company at Minneapolis, Minn. He became connected with the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., and later became superintendent of motor power of the Indiana Union Traction Company, Anderson, Ind. He was formerly master mechanic of the International Railway, Buffalo, N. Y., and at one time was master mechanic of the Indianapolis Traction & Terminal Company, Indianapolis, Ind. In 1911 he resigned as superintendent of motor power of the Indiana Union Traction Company to accept the position of manager of one of the departments of the Edgar Allen American Manganese Steel Company, Chicago, Ill. Recently Mr. Evans entered, and still is in the railway supply field, with headquarters at Chicago, Ill.

New Advertising Literature

Signal Bells.—Nachod Signal Company, Inc., Louisville, Ky., has issued catalog No. 720, which is a 14-page illustrated bulletin on highway crossing bells.

Culverts.—The Canton Culvert & Silo Company, Canton, Ohio, has issued a new catalog, No. 3, covering its "Acme" (Nestor) corrugated metal culverts and other products.

Insulators.—The Jeffrey-Dewitt Insulator Company, Huntington, W. Va., is distributing catalog No. 3, entitled "Rugged Insulators," covering different types of its disk insulators, etc.

Flooring Material.—Armstrong Cork & Insulation Company, Pittsburgh, Pa., is distributing new bulletins on "Linotile Floors" and "Armstrong's Cork Tile," copies of which may be had upon request.

Rail Bonds.—General Electric Company, Schenectady, N. Y., has issued bulletin No. 44002-A, superseding bulletin No. 44002. Bonding tools and numerous forms of bonds covering wide variations in rails and joint plates are described.

Steam Data.—The Locomotive Superheater Company, New York City, through its industrial department, has issued a "Data Book for Engineers." This is a book with flexible covers containing sixty-four pages of data of every-day interest to the steam plant engineer; besides an abbreviated steam table it contains a table of the various coals of the United States arranged by states and giving an approximate analysis.

When it comes to specifications for Hand Brakes on Double Truck City Cars—Write for information regarding

The Peacock Staffless Brake

The Most Powerful:

By virtue of its 12 to 52 Gear ratio, it gives the greatest power for the initial effort.

The Quickest in Action:

No Ratchet Lever or drop handle can compare with it for speed in application.

The Lightest in Weight:

With pressed steel housing and malleable castings it is the lightest Brake made, power considered.

There are many features to be considered. Full information on request.

Type "G" Peacock

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Buffalo, N. Y.

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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

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FARES AND BUSES
More revenue from *more* riders
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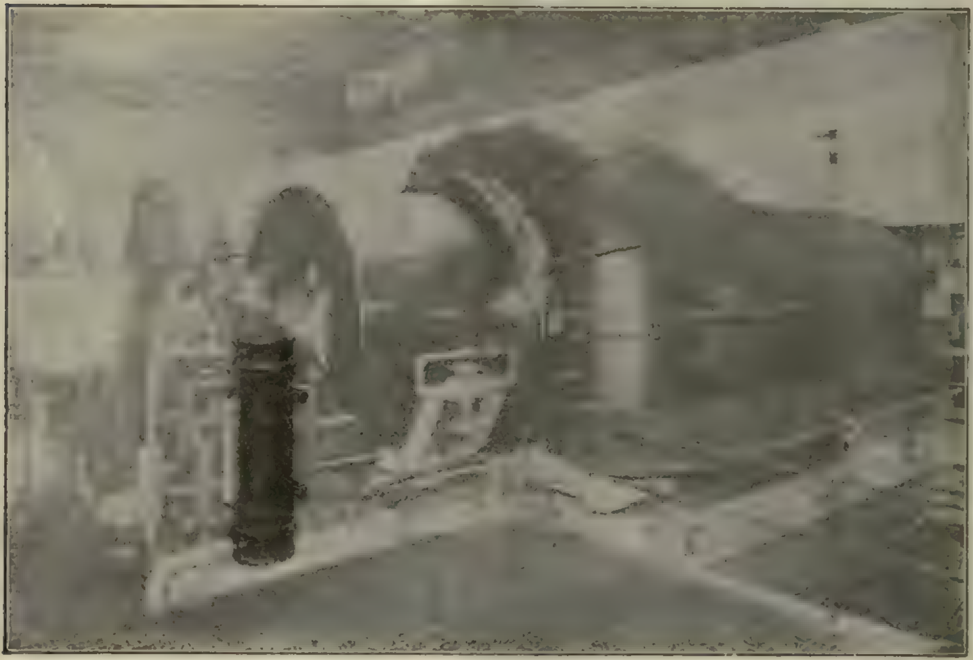
Keep Your Turbine Bearings Continuously Cool



AVOID shutdowns and bearing trouble. Cool your turbine oil continuously in the most efficient way by passing it through S & K OIL COOLERS FOR BEARINGS.

The cooling is accomplished by passing the oil in a zig-zag course across a nest of straight tubes through which the water circulates. These tubes and their attached cross-baffling may easily be withdrawn for thorough cleaning without breaking an external pipe connection.

Provided with a patented oil and water tight joint that positively prevents all seepage. Should a defect in packing occur the resulting leakage shows *externally*, thus giving immediate warning that attention is required.

Capacities range from 5 to 500 gallons a minute.

Our engineers are ready to co-operate.
Write for Catalog No. 12-G.

Valves
Injectors
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Oil Burning Equipment
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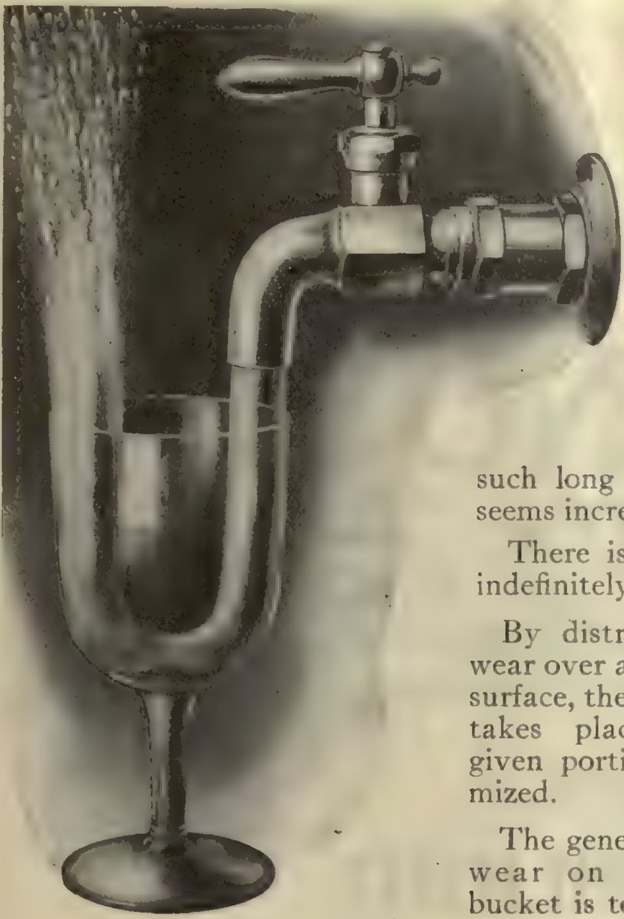


Endurance

DURING the last few months we have featured a variety of installations in locations ranking from the finest central station to the sliding river bank. In all cases one idea predominated, namely the long and continuous operation without repairs. With the average conception of a steam turbine and its principle of operation, such long and trouble-free service without repair seems incredible.

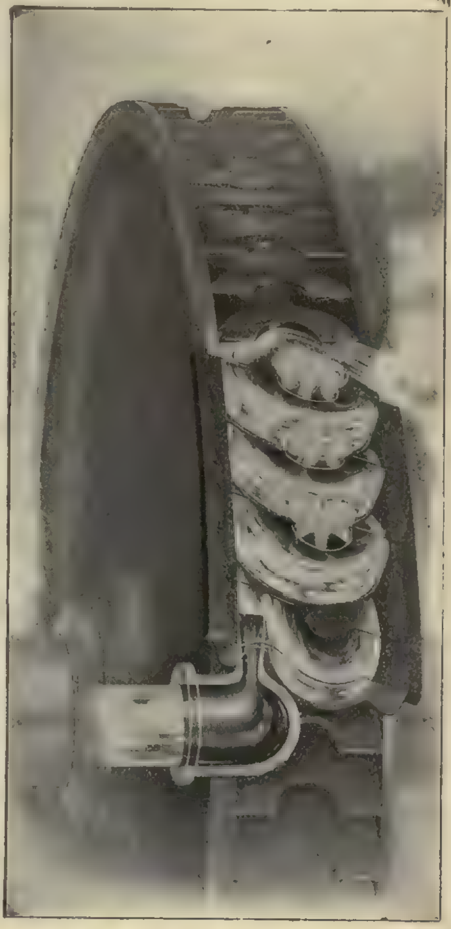
There is no material made which can stand up indefinitely under the action of steam at high velocity.

By distributing the wear over a very broad surface, the wear which takes place at any given portion is minimized.

The general effect of wear on a turbine bucket is to change its shape so that steam which was originally supposed to pass at a definite angle can no longer do so. In the Terry Turbine the steam enters the wheel at high velocity in which its direction is reversed completely like the water in the glass. Obviously the principal wear takes place on the curved surface, but at this point wear does not alter the angle at which the steam enters or leaves the wheel, consequently **Terry Turbines maintain their original capacity as well as efficiency for a great many years.**

For long and trustworthy service

Specify Terry



The Terry Steam Turbine Co.

Hartford, Conn., U. S. A.

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THE TERRY TURBINE

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NOW is the time to sell surplus new or idle used machinery, material and supplies. Equipment offered *now,* gets the benefit of present market prices and *immediate* demands.

You can reach the big buyers in Engineering fields through

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"Searchlight" advertising is the big factor of recent years in the sale and exchange of used machinery. Buyers and sellers use it to equally good advantage:

During war times it helped both government departments and private buyers to obtain necessary equipment; it enabled one advertiser to sell $4,800 worth of machinery through advertising that cost $12; another sold equipment for double the price he expected to get for it; another sold equipment in less than a month through "Searchlight" advertising, that had already been offered through other channels for over 8 months.

If YOU have surplus machinery or material on hand, NOW is the time to sell it—through the "Searchlight"

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This Book is for YOU

It describes an engineering achievement which has contributed substantially to the efficiency of water-tube boilers. It is therefore of real interest to every executive—every engineer or plant superintendent—who seeks higher operating standards and lower costs. Your copy will be sent on request.

How Boiler Troubles Are Being Remedied

Several years ago a new way to baffle boilers was devised. It was an interesting idea from the first, and became more interesting and more important as it was developed.

Directly or indirectly by means of this method of baffling, it has been possible to remedy, in one instance or another, practically every conceivable trouble and difficulty with water-tube boilers.

As a result, the total horsepower of boilers equipped with Turner Baffle Walls is now in the millions. The records of operating improvements and lowered costs are interesting reading—in some cases almost unbelievable.

Write for the Book

It tells the general story of Turner Baffle Walls, cites many specific instances and will suggest the possibility of improvements and economies in your own boilers. A new edition has lately come from the press; write for your copy now.

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Turner Baffle Walls
Produced exclusively by The Engineer Company

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Saving Through Safety—

Safety at any price is cheap.

But safety at a net saving of dollars and cents is the last word in economy.

Not only do Smith-Ward Brake Slack Adjusters promote safety by operating automatically at 100% efficiency—

They save money all the time.

Because they are so efficient and dependable they lengthen the period between inspections and thereby save through the reduction of car house labor.

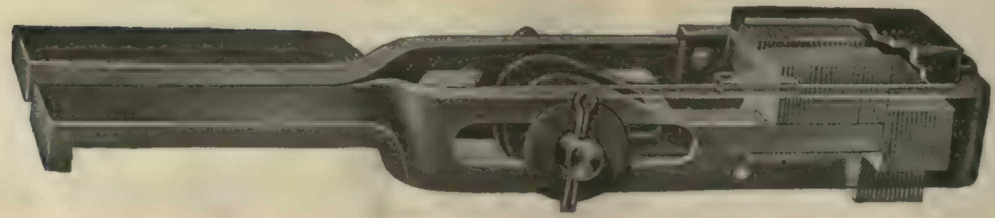
By perfect automatic adjustment they assure uniformity of brake shoe wear and increase brake shoe mileage by 20% to 75%.

There is no excuse for flat wheels where S-W Slack Adjusters are installed. They hold the brake shoes in correct position at all times.

Sixteen cents per car per day is the saving found by one electric railway official who keeps accurate cost data.

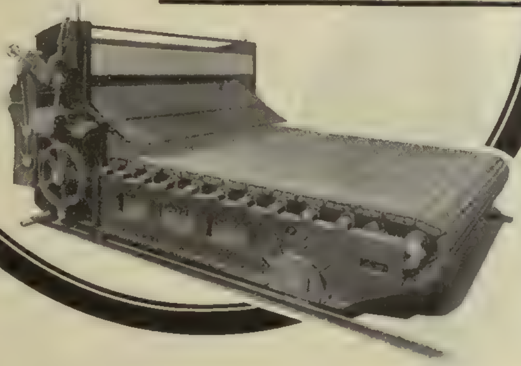
SMITH-WARD BRAKE CO.

Bush Terminal Bldg. No. 1
233 Thirty-Seventh St., Brooklyn, N. Y.



SMITH-WARD BRAKE SLACK ADJUSTERS *Are Economical!*

-adapting each installation to the special requirements of the plant



The care and judgment used by Green Engineers in adapting every stoker installation to the individual requirements of each plant is immediately evident in results.

Ample capacity to meet every demand for steam—to swing the peaks. Labor requirements so low as to be not even approached by any other stoker. And combined with these advantages a third, which becomes more important each day.

The ability to burn the *available* coal—the coal you can get for the least money per thousand B.t.u., *delivered*.

These are the items of first importance guaranteed by the Chain Grate stoker as built and installed by Green Engineers. In these three elements you will find the reason why organizations like the Iowa Railway & Light Co. are renewing their faith in the Chain Grate Stoker.

Write for the Green Book!

"What B. & W.'s 'Steam' is in the boiler industry the Green Book 'Progressive Combustion' is in the stoker field" remarks a prominent Electric Railway Superintendent. "It's a sound, sensible simple text book on coals and how to burn them." Department C will be glad to send you a copy.

GREEN ENGINEERING COMPANY

100 Kennedy Ave., East Chicago, Indiana

Backed by 23 Years of Specialized Experience

GREEN Sealflex Arches
GREEN Pressure Waterbacks
GREEN Steam Jet Ash Conveyor
GREEN Cast Iron Ash Tanks

GREEN

CHAIN GRATES

Chillingworth Brackets

Meet all Tests

One of the distinguishing features of the Chillingworth Gear Case is the design and construction of the brackets.

Like the case itself these brackets are the result of long experience and careful study by men who have specialized in Gear Case requirements.

These brackets are made of the best quality malleable iron designed to afford maximum strength and durability.

The brackets are properly riveted to the gear case and reinforced on the inside of the case by an extra piece of plate, obviating any danger of the rivets working loose.

Note the flanges and overlapping portions of the brackets supporting the case vertically as well as horizontally.

We adjust these brackets with the utmost accuracy in order to allow the case to be applied to the motor easily without strain or distortion.

Chillingworth Manufacturing Company

Jersey City, N. J.

Sales Department: Thayer and Company, Inc., 111 Broadway

Jharr

The Brahmin believes that his body is a jharr or forest in which he wanders.

—that his desires represent a bandage upon his eyes

—that his mistakes are the robbers who have brought him into the forest.

All of which indicates that he knows a few things about the carbon brush market, for if ever there was a forest wherein there is so much blindfold groping and so many mistakes which further bewilder the groper, it is the aforementioned carbon brush *forest.*

Since the advent of prescribed Morganite brushes it has become known as the carbon brush FIELD, for we have cleared the forest, removed the blindfold of haphazard choosing of brushes and substituted engineering prescription.

So don't harbor backwoods brush methods—come on out where it's light.

Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th St., New York

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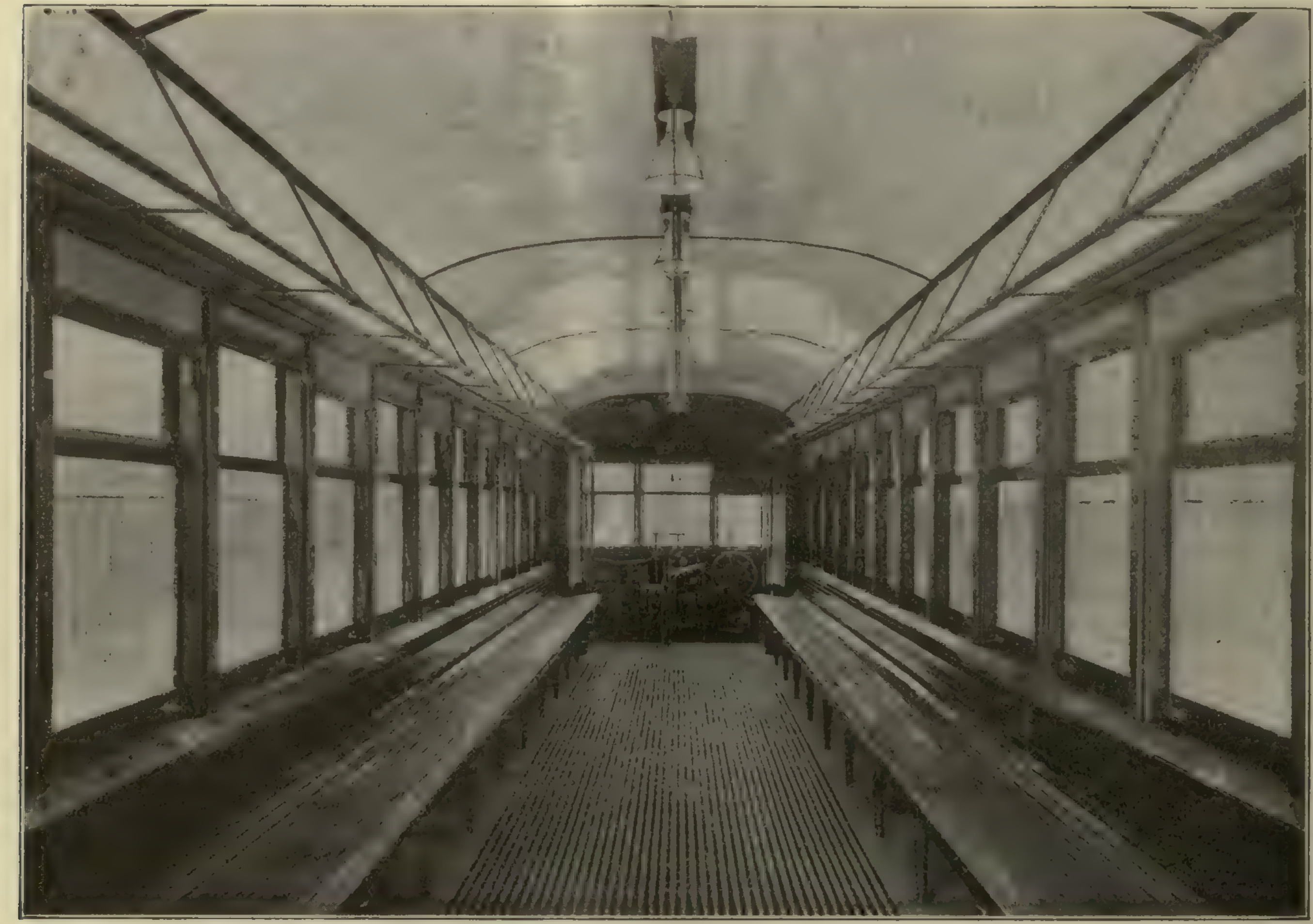


The Philadelphia Traction Company's 100 New Cars are Equipped with

Nevasplit Headlinings

NEVASPLIT is used on the 100 cars ordered through the Emergency Fleet Corporation for operation by the Philadelphia Rapid Transit Co. to the Hog Island Shipyards.

It pays to start right when buying new cars. Replacements are expensive.

Nevasplit Headlining reduces maintenance costs to the lowest degree. Once put up, it stays up without warping or splitting. It is waterproof, reduces the weight of the car and adds safety and beauty to the car interior.

Write for booklet and samples of Nevasplit.

The Keyes Products Company

120 Broadway, New York

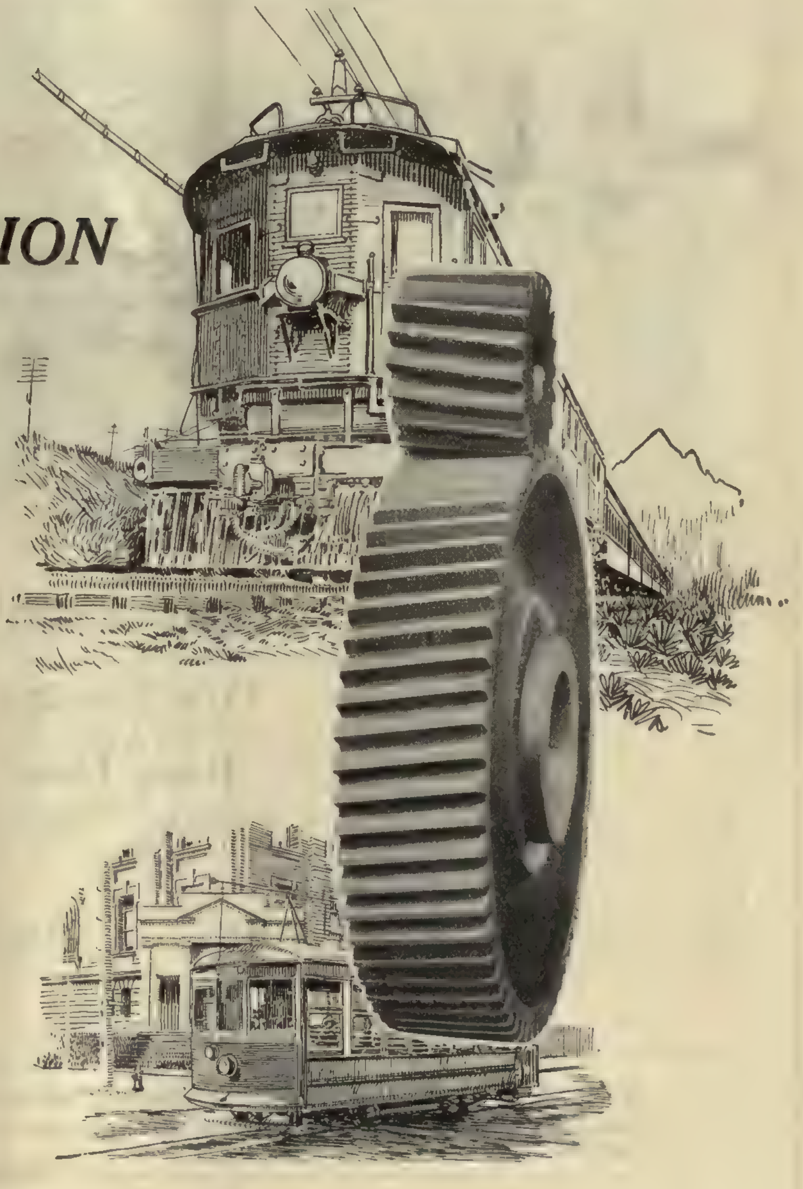
General Sales Agents: Columbia Machine Works and Malleable Iron Company, Brooklyn, N. Y.
National Safety Car & Equipment Co., St. Louis, Mo.

Nuttall Helical Gears

A PROVEN SUCCESS

NO LIMIT OF APPLICATION

locomotives—
interurban cars—
safety cars—



This is the range of Nuttall Helical Gear application. Over 200 companies are using the quiet helical gears on their rolling stock which includes all types from the mighty locomotive to the snappy little safety cars.

Nuttall Helical Gears transmit maximum power in a quiet vibrationless way which has made them an unequalled success in their field.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

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Solid Forged Geared Blanks

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"The 'Standard' Brand on your material is an assurance of eventual economy."

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Osgood Bradley Safety Cars

have an improved arrangement of the Standard Safety Devices Equipment

Every Osgood Bradley Safety Car carries the safety devices combination of the Safety Car Devices Company.

This combination is furnished with either the General Electric or Westinghouse compressor and other air-brake accessories as especially devised for the safety car.

To insure the greatest possible protection against breaks, freezing troubles and service interruptions generally, as much of the piping as practicable is carried inside the car alongside the truss plank or heater panels; all valves of the safety devices combination are inside the car; and the pneumatic door engine is placed directly under the car operator's seat where it can be inspected and repaired in place if necessary.

The sand-boxes are Osgood Bradley pneumatic traps. These traps will keep out water from any source—whether from melting snow on the feet of the passengers, from car-washing, etc., so that dry sand is always available.

And this sand will get to the spots where it will do the most good because each trap is fitted with a pipe that leads directly to the rail without bends or offsets. Osgood Bradley Safety Cars are Long Life Cars.

Builders of City and Interurban Cars

OSGOOD BRADLEY CAR COMPANY

Builders to Two Generations of Electric Railway Men

WORCESTER, MASS.

CYPRESS

"The Wood Eternal"

gives insurance against a continuous big *labor cost* for renewals and replacements in the many railway uses for lumber.

When you specify and use

All Heart Cypress for Ties, Fencing, Trunking and Capping, Cross Arms, &c

you know it will give longer service than any other material. You know, too, how labor costs exceed material costs in almost every case. Of course even Cypress may eventually have to be replaced. Nothing lasts quite "forever." But in the long service-life you get from all-heart Cypress you will have *saved* a lot of labor costs in *maintenance alone.*

Anyway, that's why a number of the biggest railways in the country *insist* on All-Heart Cypress.

S C M A No. of Mill

TRADE MARK REG. U.S. PAT. OFFICE

"*Buy by the Cypress Arrow.*" Look for this mark on the end of every piece—or on every bundle. Our data is at your service.

Southern Cypress Mfrs.' Association
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CYPRUS BRONZE

The Brady Brass Company is the original manufacturer of the soft bearing metal known as Cyprus Bronze, which is now being used in almost every country of the world for

Engine Castings, Railway Journal Bearings and High Speed Motor Bearings

It is more generally known as M. C. B. Grade "A" Specification.

The original formula was developed by this company after a railroad experience of more than two score years, and from an economic standpoint—high in lead and low in tin contents—continues to meet with great favor.

Today we are selling Cyprus Bronze metals, M. C. B. Grade 'A" Specification, wherever railways are operating. This has been made possible by the building up of a splendid organization of trained men, located in an up-to-date plant at tidewater of such a capacity as to insure prompt deliveries anywhere.

We respectfully solicit your inquiries

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General Office and Works:
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Your Safety Cars Need
NACHOD SIGNALS

Nachod Signals are simple—nothing to get out of order about them, and they use the power already in your trolley line. A set of indications by color disks and lights, brilliant by day or night; an overhead trolley contactor to change the indications as car passes it, and having no moving parts; and an oil sealed relay to hold the circuits for the indications—that's all. Nachod Signals are reliable in operation, easy to install and maintain.

NACHOD SIGNAL CO.
INC.,
Louisville, Ky.

Anderson Wood Strain Insulator

The taking up of slack in guy wires is usually accompanied by twisting of the wire. This weakens the guy, defeating its very purpose. Anderson Double Take-Up Wood Strain Insulators were designed to overcome this difficulty. The double take up feature enables you to take up the slack in just half the amount of time. These insulators combine all the essential features of good insulation, high tensile strength and perfect adjustment.

Send for Catalog 8

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(Established 1877)
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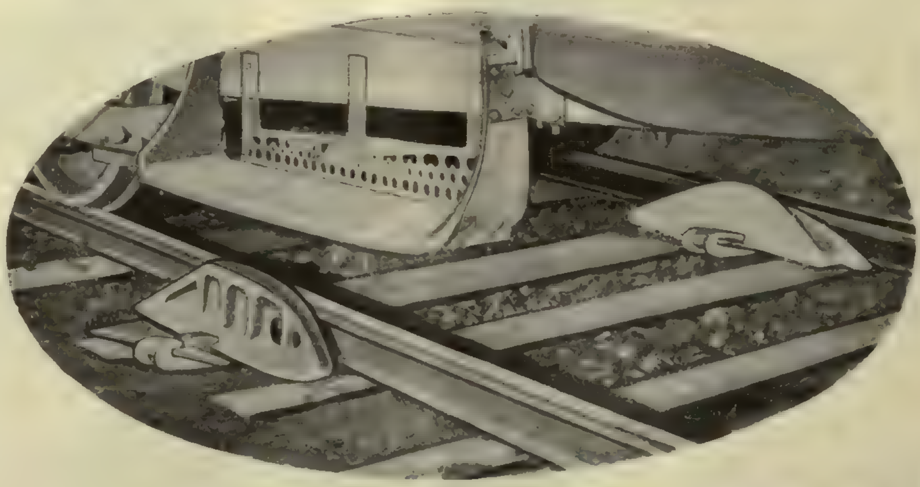
TYPE B REPLACER AND CLAMPS

FOR SUBURBAN TROLLEY SERVICE

NO SPIKING REQUIRED—CLAMPS HOLD REPLACER



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BRANCH OFFICES

Massey Poles Do Double Duty

The adaptability of Massey Poles to the two-fold purpose of trolley support and lighting standard is illustrated above.

Made by a special centrifugal process that insures their lightness and strength, Massey Hollow Reinforced Concrete Poles require no maintenance and provide a support which is pleasing in appearance as well.

Data on this installation and others is available and will gladly be sent upon request.

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Oliver Bldg.

St. Louis
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Atlanta
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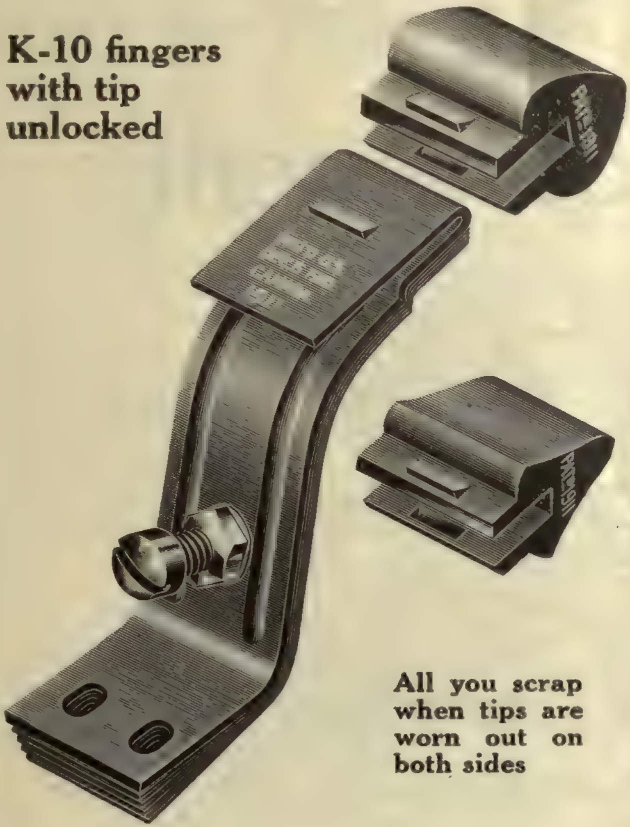
925 S. 6th St., W.



K-10 fingers with tip unlocked

All you scrap when tips are worn out on both sides

Never Make a Big Repair When a Little One Will Do

You would think it the height of folly to scrap a controller because a finger had worn out, wouldn't you?

Then why scrap a controller finger simply because the tip has worn out? The principle is the same. Triggerlock fingers are designed to eliminate just that waste of material, money, and shop time necessary for the installation of new fingers.

The finger lasts indefinitely, and with a stock of interchangeable renewal tips it becomes almost a permanent part of the controller.

There is a triggerlock finger for every type of controller. Yours is among them.

Write for catalogue, or put in a requisition now.

Russell Manufacturing Co.

814 Bath Ave.
Niagara Falls, N. Y.

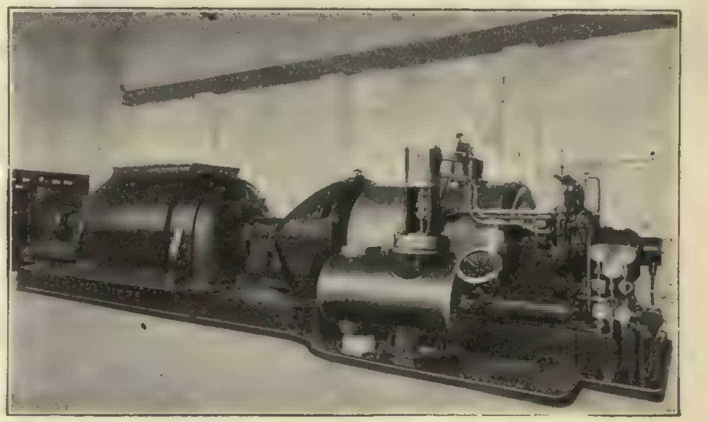
557 King St. West
Toronto, Canada

Allis-Chalmers Steam Turbine

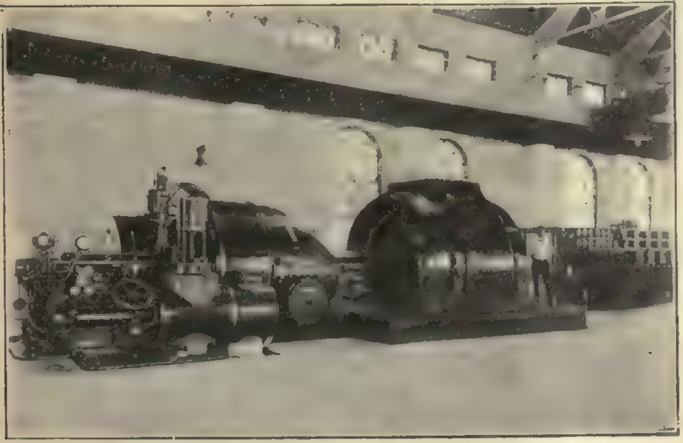
Sizes from 200 K.W. up.

Built for
Continuous Service, Durability and Accessibility for Inspection.

Unequalled for
Sustained efficiency and reliability in operation.



4000 KW. max. 80% P. F. 3600 R.P.M. Allis-Chalmers Steam Turbine and Alternator Unit with direct connected Exciter installed in a Western power plant.



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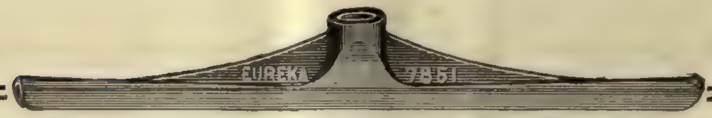

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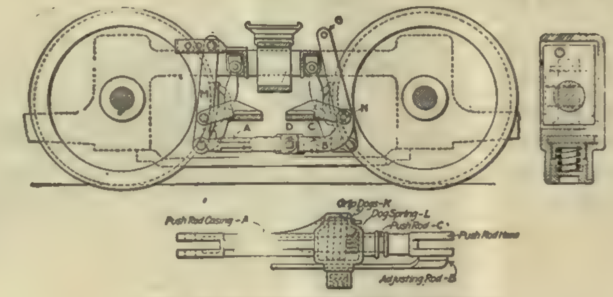

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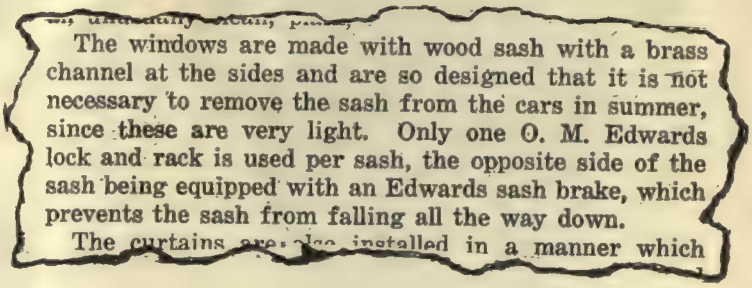

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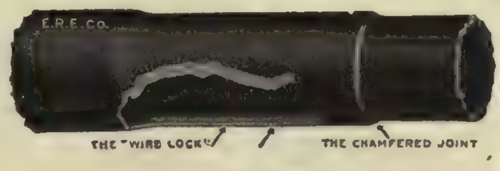

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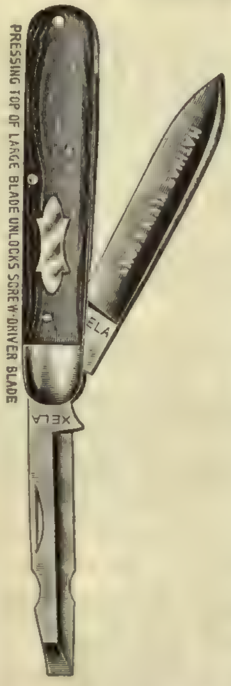
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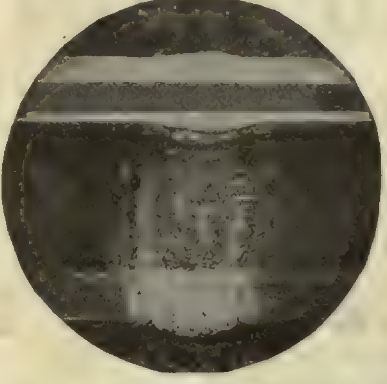

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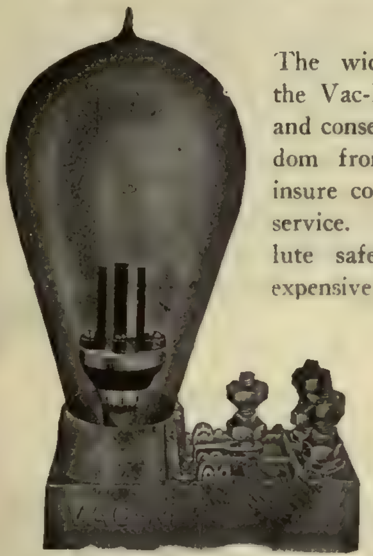

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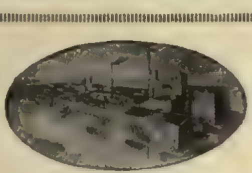

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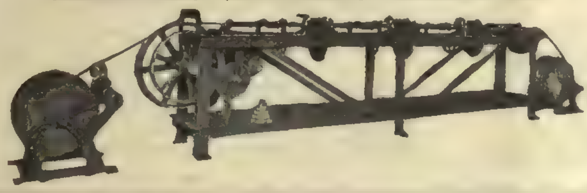

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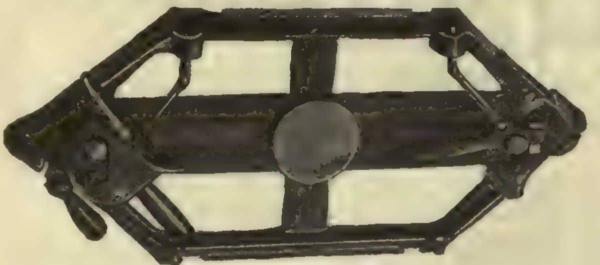

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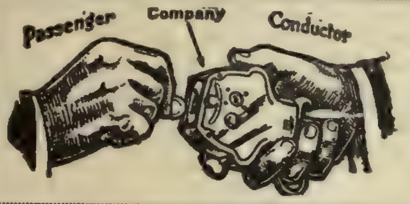

Direct Automatic Registration By the Passenger
Rooke Automatic Register Co.
Providence, R. I.

The purpose of a fare box is to insure the safe delivery to your counting room of every fare collected on your car.

Cleveland Fare Boxes take your fares direct from Car Rider to Counting Room.

The Cleveland Fare Box Co.
Cleveland, Ohio
Canadian Branch: Preston, Ontario

"It Behooves You to Hooverize Your Motormen"
We can help you
Write to
The Arthur Power-Saving Recorder Co.
2nd National Bank Bldg., New Haven, Conn.

Use them in your terminals—
PEREY TURNSTILES or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co., Inc.
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Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost
The Cooper Heater Company
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SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

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Carbon Brushes are uniform. They talk for themselves.

W. J. Jeandron
227 Fulton Street
New York City

Pittsburgh Office:
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Canadian Distributors:
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MORE-JONES "TIGER-BRONZE" AXLE AND ARMATURE BEARINGS

Not always the cheapest, but ever lowest in ultimate cost

MORE-JONES BRASS & METAL CO.
St. Louis, Missouri.

B A. Hegeman, Jr., President; Charles C. Castle, First Vice-President; Harold A. Hegeman, Vice-President and Treasurer; Fred C. J. Dell, Secretary; W. C. Lincoln, Manager Sales and Engineering.

National Railway Appliance Co.

50 East 42nd St., NEW YORK CITY
Hegeman-Castle Corporation, McCormick Bldg., Chicago Ill.
National Railway Appliance Co., Munsey Bldg., Washington, D. C.
National Railway Appliance Co., Little Bldg., Boston, Mass.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions, Anderson Slack Adjusters, Genesco Paint Oils, Clapp's Fire Resisting Paint, Dunham Hopper Door Device, Feasible Drop Brake Staffs, Anglo-American Varnishes, Paints, Enamels, Surfaces, Shop Cleaner, Johnson Fare Boxes, Drew Line Material and Railway Specialties, Perry Side Bearings, Miller Trolley Shoes, Hartman Centering Center Plates, Economy Power Saving Meters, H. and W. Electric Heaters, Garland Ventilators, Pitt Sanders, National Safety Car Equipment Co.'s One-Man Safety Car

Buy Your Motor Bus and Truck Accessories at Jobbers' Prices

UNITED SPARK PLUGS

Heavy duty, retail price $1.00, jobbers 45c., for buses, trucks and heavy cars.

Junior, retail price 75c., jobbers 35c., for light cars.

We can also supply you with Velvet Recoil Deadeners for $35.00 per set, also Aero Carburetors, $35.00; Opco Carbon Remover, 10 quarts, $10.00 per case.

We would suggest that you write us for folders relative to these accessories before purchasing elsewhere.

BLOCK AUTOMOTIVE CO.
Charlotte, N. C.

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NO *isolated* technical journal can enjoy one great advantage which helps make each McGraw-Hill publication dominant in its field.

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F-1

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Buttons and
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that last—
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For fifty years we have served American Railways in the supply of durable and dependable sundries such as buttons, badges, punches, etc. You can feel sure that their quality today is of the same high standard as always.

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AMERICAN RAILWAY SUPPLY CO.
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DIFFERENTIAL
UTILITY CARS

Electric Railways!

GET FREIGHT BUSINESS!

For economy, use Differential Cars.

"If it is only a dump car it is not a Differential"

Differential Car Company, Inc.
141 Broadway
New York

The "Hycap-Exide" Battery
for
STORAGE BATTERY
STREET CARS

THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

162 RAILROADS
USE DIXIE CUP
Penny Vending Machines
To Solve their Drinking Cup Problems
in Cars and Stations
INDIVIDUAL DRINKING CUP COMPANY, INC.
HUGH MOORE, President
Original Makers of the Paper Cup — 220-230 W. 19th Street New York

"Boyerized" Products Reduce Maintenance

Bemis Trucks
Case Hardened Brake Pins
Case Hardened Bushings
Case Hardened Nuts and Bolts
Manganese Brake Heads
Manganese Transom Plates
Manganese Body Bushings
Bronze Axle Bearings

Bemis Pins are absolutely smooth and true in diameter. We carry 40 different sizes of case hardened pins in stock. Samples furnished. Write for full data.

Bemis Car Truck Co., Springfield, Mass.

AJAX BULL BABBITT

The purest virgin metals in correct formula alloyed by the highly perfected Ajax *process* enable us to guarantee that for general purposes Ajax Bull Babbitt will wear longer and run cooler than Genuine, other tin base or lead base babbitts.

THE AJAX METAL COMPANY
Established 1880
Main Office & Works: Philadelphia, Pa.
Southern Plant: Birmingham, Ala.

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

ADVERTISING RATES

POSITIONS VACANT—Business Opportunities and other undisplayed ads, 8 cents a word, minimum $2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:

1 to 3 in., $4.50 an in.	15 to 29 in., $3.90 an in.
4 to 7 in., $4.30 an in.	30 to 49 in., $3.80 an in.
8 to 14 in., $4.10 an in.	50 to 99 in., $3.70 an in.

POSITIONS VACANT

CAR painters wanted for large interurban railroad. A man of experience thoroughly familiar with coach painting, who can push production, will have a permanent position and a good future. P-737, Elec. Ry. Journal.

ELECTRICAL engineer wanted, with some experience in street railway work, in city in Middle West; state experience, references, and salary desired when replying. P-605, Elec. Ry. Journal, Old Colony Bldg., Chicago.

EXPERIENCED electric street car shop superintendent wanted. Applications must state in detail past experience, present salary, salary expected, if married or single and age. Applications treated strictly confidential. P-741, Elec. Ry. Journal, Old Colony Bldg., Chicago.

EXPERIENCED man wanted in overhauling cars and motors and maintenance of equipment good position for steady man. Kankakee Electric Railway Co., Kankakee, Ill.

GENERAL foreman of electric railway repair shop employing fifty men desires man experienced in modern overhauling and maintenance methods and capable of getting results; heavy interurban high-speed equipment; location Middle West; give full information in first letter. P-735, Elec. Ry. Journal, Old Colony Bldg., Chicago.

PERMANENT position open for several draftsmen with knowledge of street railway track work. New York Switch & Crossing Co., 15th and Madison Sts., Hoboken, N. J.

TRAIN dispatcher wanted for electric interurban railway, hours 2:00 to 11.00 P.M., salary $190.00 per month. Gary Street Railway, Gary, Indiana.

YALE University needs an instructor in electrical engineering for the university year which starts September 30. Opportunity for advancement to young man who desires university work. Beginning salary $1,500. For further particulars write or wire Department of Electrical Engineering, 10 Hillhouse Ave., New Haven, Conn.

POSITIONS WANTED

RAILWAY electrical engineer, age 37, married, technical graduate; 13 years' experience location, construction, operation; intimately familiar with power plant operation, design and repair of rolling stock, overhead line (direct suspension and catenary), transmission and distribution. Accustomed to operation under Standard Code rules, understand schedule making and handling of trains; seeks position as electrical engineer with moderate or large interurban, or superintendent of smaller property; salary $3,000; prefer Eastern or Southern location. PW-739, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

POSITIONS WANTED

ABLE engineering executive desires correspondence with officers or general managers of Class A or B property anticipating a change in personnel or type of organization; eight years' experience in design, erection, operation and maintenance of street and interurban railway rolling stock; five years' general operating experience; at present manager of a small property. PW-731, Elec. Ry. Journal, Old Colony Bldg., Chicago.

ENGINEER, construction, maintenance, ways and structures; 15 years' experience, 8 years in charge of men on track, overhead, bridges and transmission lines, also electric welding work. Age 34, married. Best references. PW-742, Elec. Ry. Journal, Real Estate Trust Bldg., Pa.

RAILS

25 tons New 6 in., 72 lb., High Tee Rail.
110 tons Relay 9 in., 90 lb. Grooved Girder.
New and Relaying Rail in other Weights and sections available for immediate shipment from stock.

ZELNICKER IN ST. LOUIS

Get Bulletin 285—exceptional bargains

EXECUTIVE

open for engagement. 20 years experience in Street Railway Transportation. Last 5 years as Superintendent of Company operating in 3 Cities. Successful in handling Labor and maintaining discipline, also conversant with Claim work, have handled Claim Dept. for 5 years.

PW 740—Elec. Ry. Jour.
1570 Old Colony Bldg. Chicago, Ill.

New—Used—Rebuilt

MACHINERY AND SUPPLIES

for construction and industrial work.

READING ENGINEERING CO., INC.
154 Nassau St., New York

10,000 TIES 8 FT. 0 IN.

Hemlock and tamarack cut from 7-in. to 8-in. logs making ties 5-in. to 6-in. thick with faces 4-in. to 6-in. wide; immediate shipment from Menominee, Mich.

ACME TIE CO.
Century Bldg., Pittsburgh, Pa.

"ELECTRICAL HAND BOOK"

The "Burgess Blue Book" contains drawings and diagrams of Electrical Machinery and Connections—Starting Boxes, Elevators, Controllers, Starters for Printing Press Motors, Street Car Controllers, Transformer Connections, Lighting Circuits.

The section on Calculations takes up Simple Electrical Mathematics, Wiring Tables, Alternating Current Calculations, etc. It also gives 200 formulas, with problems worked out, showing their application.

Price $1.00. If you decide not to keep it, your money will be returned.

BURGESS ENGINEERING CO.
752 East 42nd St., Chicago, Ill.

FOR SALE AT A BARGAIN

ALL THE

CARS

of The Blue Hill St. Ry., fully equipped, G. E. 80s, 800s and 1000s.

George Spaulding, Receiver
Canton, Mass.

IMMEDIATE DELIVERY

Twenty-Five Cycle Rotary Converters

2—300-kw. 3-phase, 25-cycle, 600-volt, General Electric rotary converters, complete with transformers, primary voltage 13,200, secondary 380-volts.

1—250-kw., 3-phase, 25-cycle, 600-volt, General Electric rotary converters, complete with transformers, primary voltage 13,200, secondary 380 volts.

Street Railway Motors

20—G. E. 800's, complete with controllers.

All in Splendid Condition

JOSEPH MYERSON, 411 Atlantic Ave., Boston 9, Mass.

Passenger Cars and Snow Plows

FOR SALE

Twelve—34 Ft., Easy Access double truck cars—"M." Control—will furnish trucks and motors if desired and put cars in good operating condition.

Two Hundred—25 Ft., to 30 Ft., double truck closed cars with vestibules platform complete with trucks, motors "K" control—ready to run.

These cars can easily be rebuilt for PREPAYMENT operation if desired.

Two Hundred—12, 13, 14 and 15 Bench double truck open cars—in good condition—with equipment if desired—available for immediate delivery—and ready to run.

A number of single truck SHEAR SNOW PLOWS—equipped with motor—ready for next Winter's service

TERMS—Cash or easy payments—Car Trust Certificates if desired

EASTERN MASSACHUSETTS STREET RAILWAY CO.

Address Purchasing Dept. **No. 1 Beacon Street, BOSTON, MASS.**

POWER PLANT EQUIPMENT

FOR IMMEDIATE SALE

GLOUCESTER, MASS.:

2—203 hp. B. & W. Water tube boilers
1—266 hp. B. & W. Water tube boiler
1—600 hp. B. & W. Water tube boiler
1—300 hp. 22 in. x 48 in. Harris-Corliss Single Engine
1—500 hp. 28 in. x 36 in. Hamilton-Corliss Single Engine
1—1500 hp. 30 in. x 48 in. x 48 in. Penn-Corliss Cross Compound Engine
1—250 kw. W. H. Belted Multipolar D.C. Generator
1—400 kw. G. E. Eng. Type Multipolar D.C. Generator
1—850 kw. G. E. Eng. Type Multipolar D.C. Generator
Switchboard and Misc. Auxiliary equipment

NEWBURY, MASS.:

3—115 hp. Kendall Horizontal Return Tubular Boilers
2—14 in. x 28 in. x 36 in. Slater-Corliss Cross Compound Engines
2—250 kw. W. H. Eng. type Multipolar D.C. Generators
Switchboard and Misc. Auxiliary equipment

ESSEX, MASS.:

2—150 hp. Kendall Horizontal Return Tubular boilers
1—150 hp. new eng. horizontal return tubular boiler
2—13 in. x 23 in. x 22 in. McIntosh & Seymour Tan. Com. High Speed Engines
2—220 kw. Walker Eng. Type Multipolar D.C. Generators
1—55 kw. G. E. Direct connected 200 volt Booster Set.
1—150 hp. New Eng. Boiler
Switchboard and Misc. Auxiliary equipment

LAKEVILLE, MASS.:

3—250 hp. A. & T. Water Tube Boilers
1—16 in. x 30 in. x 42 in. Hamilton-Corliss Cross Compound Engine
1—325 kw. W. H. Eng. Type Multipolar D.C. Generator
Switchboard and Misc. Auxiliary equipment

SALEM, MASS.:

1—2500 A.B.H. G. E. Curtis Horizontal 60 Cycle, 445 volts A.C. Turbo, Generator and Direct connected Exciter
1—Alberger Spiroflo jet condenser and Auxiliaries.

HYDE PARK, MASS.:

3—500 hp. B. & W. Water Tube Boilers
1—1500 hp. 30½ in. x 52 in. x 48 in. Penn Cross Compound Engine
1—750 hp. 20 in. x 40 in. x 48 in. Greene Cross Compound Engine
1—700 hp. 20 in. x 40 in. x 42 in. Penn. Cross Compound Engine
1—850 kw. G. E. Direct Connected D.C. Generator
1—525 kw. G. E. Direct Connected D.C. Generator
1—500 kw. G. E. Direct Connected D.C. Generator
Condensers, Pumps, Blowers, Boosters, Switchboard and Miscellaneous Auxiliary equipment.

Inspection Solicited—Details upon Application.

Terms Cash or Easy Payments. Car Trust Certificates if Desired.
Equipment released on account of purchasing power.

EASTERN MASSACHUSETTS ST. RY. COMPANY

Address Purchasing Dept. **1 Beacon Street, Boston, Mass.**

Machinery in Stock for *Immediate Shipment*

ROTARY CONVERTERS

1—300 kw., Westg., 3-phase, 60-cycle, 370-v., A.C., 575-v., D.C., 600 r.p.m.

2—200 kw., G.E., 3-phase, 25-cycle, 85-v., A.C., 125-v., D.C., 8 pole, 375 r.p.m.

FREQUENCY CHANGER SETS

1—600 kva., Allis-Chalmers Frequency Changer Set, 300 r.p.m., 3-phase, 60-cycle, 2300-v. one end, 3-phase, 6600-v., 25-cycle on other end.

1—400 kw., G. E., 3-phase, 25-cycle, 6000-v. one side—2400-v., 2-phase, 60-cycle other side—375 r.p.m.

ARCHER & BALDWIN, INC.
114-118 Liberty Street, New York City
Telephone 4337-4338 Rector

Some One Wants to Buy

the equipment or machinery
that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it *Before* depreciation *Scraps* it.

0178

New Safety Cars

FOR SALE

Eight new single truck, double end, one-man safety motor passenger cars with two motors all fully equipped ready to run. Colors green and buff in enamel (numbered but not lettered).

Shipment Immediately from Car Works.

Federal Light & Traction Company
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FOR SALE

16 West. 56 Motors. 4 K-14 Controllers. 4 National type BB-4 Air Brake Equipments complete. 15 Double Truck Cars, 40-ft. long, mounted on Brill Trucks equipped with 4 GE-67 Motors, 2 K-6 Controllers. Air Brakes, etc., complete.

Electric Equipment Co.
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FOR SALE

COMPLETE POWER PLANT

B. & W. boilers, Corliss Engines, G. E. 550 D. C. volt Generators; first class condition; immediate delivery.

EASTERN WISCONSIN ELECTRIC CO.
Fond du Lac, Wisconsin

5—Rotaries—300 K.W.

600 volt D.C., 25 cy. A.C. Trans. 15,000 volt, complete with Switchboards. Bood condition.

BARGAINS

Send for our used mach. list.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

WORRYLESS ELECTRICAL REPAIRS

On all kinds and sizes A.C. or D.C. motors and generators, starters, welders, controllers, or anything electrical. Quick shipment from stock material, of coils commutators—shafts—bearings, etc Remember our initials stand for our product.

CAREFUL CLEVELAND ACCURATE ARMATURE WORRYLESS WORKS, Inc.

EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND INC. 1918

MAC GOVERN & COMPANY INCORPORATED POWER MACHINERY

Prompt Shipment From Stock

2—Brill double truck combination passenger and baggage cars, 38 ft. long overall, passenger compartment 19 ft. 6 in. long, baggage compartment 8 ft. 7 in. long, equipped with four No. 101-B Westinghouse motor equipment complete.

1—Work car, equipped with two No. 49 Westinghouse motors complete.

40,000 lbs. No. 4/0 grooved trolley wire.

8 miles of 350,000 c.m. stranded, cable, bare.

3 miles of No. 4/0 weatherproof insulated wire.

27 miles of No. 4 hard drawn copper wire.

MacGovern & Company, Inc.
114 Liberty Street, New York, N. Y.

BRANCH OFFICES:
Pittsburgh, Pa., 498 Union Arcade Bldg
Seattle, Wash., L. C. Smith Bldg.
Montreal, Que., 285 Beaver Hall Hill

Caution—RAIL USERS

BUY NOW. There is a SCARCITY. We offer the following NEW RAILS for prompt shipment:

New 12-lb. and 30-lb. rails, splices, bolts and nuts.

New 90-lb. rails, angle bars, bolts, nuts and spikes.

They will be gone soon. Write or wire for our quotations.

Wire—300,000 lb. or more of copper trolley, feeder, high tension, etc.

A number of steel bridges on line of Cincinnati & Columbus Traction Co. For quick acceptance at $1.00 per 100 lb. as is. Photographs on request.

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531 Peoples Gas Bldg., Chicago

BRANCH OFFICES: First National Bank Bldg., Pittsburgh, Pa.; Railway Exchange Bldg., St. Louis, Mo.; East Chicago, Ind.; New York: Woolworth Bldg.
YARDS AND WAREHOUSES: East Chicago, Ind. and St. Louis, Mo.

For Every Business Want: "Think SEARCHLIGHT *First"*

1910

NEW

80 lb. RAIL & ACCESSORIES

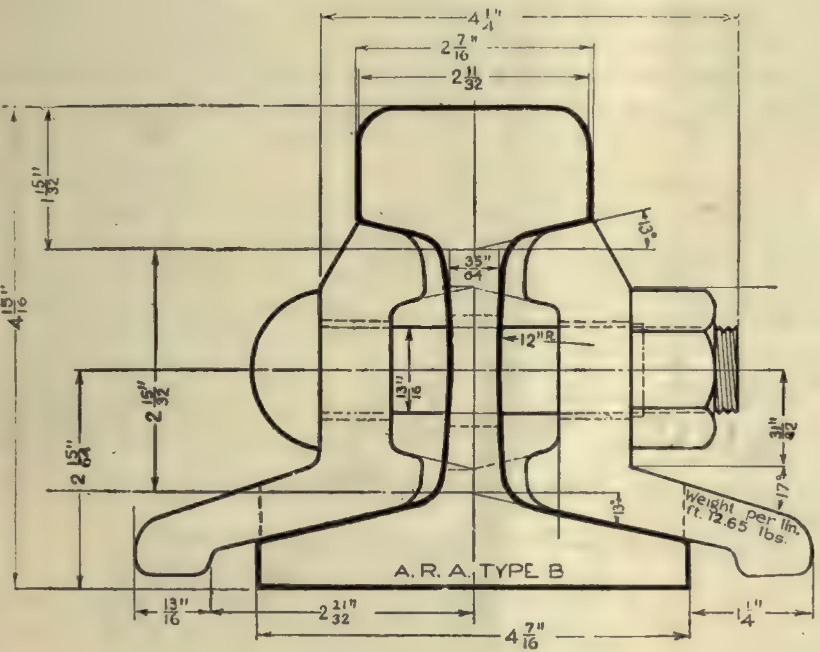
ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

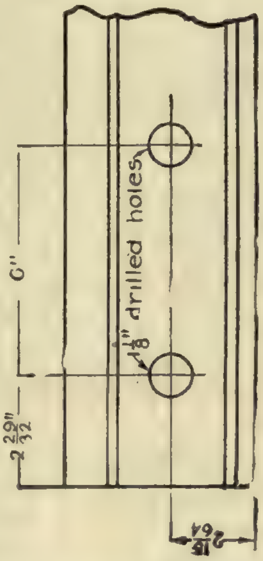
For Sale

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.





Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

St. Louis Office
2115 Railway Exchange Building

We buy electric and steam railways that are to be dismantled

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service and Apparatus
- Oxweld Acetylene Co.

Advertising, Street Car
- Collier, Inc., Barron G.

Air Aftercoolers
- Ingersoll-Rand Co.

Air Receivers
- Ingersoll-Rand Co.

Ammeters
- Weston Electrical Instrument Co.

Anchors, Guy
- Electric Service Supplies Co.
- Ohio Brass Co.
- Track Specialties Co.
- Westinghouse Elec. & Mfg. Co.

Angle Bars
- Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
- Green Engineering Company

Automobiles and Buses
- Brill Co., The J. G.

Axles
- Bemis Car Truck Co.
- St. Louis Car Co.

Axle Straighteners
- Columbia M. W. & M. I. Co.

Axles, Car Wheel
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Standard Steel Works Co.
- Westinghouse Elec. & Mfg. Co.

Babbitt Metal
- Ajax Metal Co.
- More-Jones Brass & Metal Co.

Babbitting Devices
- Columbia M. W. & M. I. Co.

Badges and Buttons
- American Railway Supply Co.
- Electric Service Supplies Co.
- International Register Co., The

Batteries Dry
- National Carbon Co., Inc.
- Western Electric Co.

Batteries, Storage
- Electric Storage Battery Co.
- National Carbon Co., Inc.

Bearings and Bearing Metals
- Ajax Metal Co.
- Bemis Car Truck Co.
- Brady Brass Co.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- More-Jones Brass & Metal Co.
- St. Louis Car Co.
- Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
- Stucki Co., A.

Bells and Gongs
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- St. Louis Car Co.

Belt Fasteners, Lacing Hooks and Rivets
- Crescent Belt Fasteners Co.

Benders, Rail
- Niles-Bement Pond Co.
- Reading Specialties Co.
- Track Specialties Co.

Boilers
- Babcock & Wilcox Co.
- Boiler Cleaning Compounds

Bond Testers
- American Steel & Wire Co.
- Rail Welding & Bonding Co.

Bonding Apparatus
- American Steel & Wire Co.
- Electric Railway Improv. Co.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Oxweld Acetylene Co.
- Rail Welding & Bonding Co.

Bonds, Rail
- American Steel & Wire Co.
- Copper Clad Steel Co.
- Electric Railway Improv. Co.
- Electric Service Supplies Co.
- General Electric Co.
- Ohio Brass Co
- Rail Welding & Bonding Co.
- Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
- Niles-Bement-Pond Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
- American Bridge Co.
- Bates Expanded Steel Truss Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Hubbard & Co.
- Ohio Brass Co.

Brake Adjusters
- Gould Coupler Co.
- National Ry. Appliance Co.
- Smith-Ward Brake Co.
- Westinghouse Traction Brake Co.

Brake Shoes
- Amer. Brake Shoe & Fdry. Co.
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

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- Ackley Brake & Supply Corp.
- Allis-Chalmers Mfg. Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- National Brake Co.
- Safety Car Devices Co.
- St. Louis Car Co.
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Bricks, Fire
- Green Engineering Co.

Bridges & Buildings
- American Bridge Co.

Brooms, Track, Steel or Rattan
- Paxson Co., J. W.
- Western Electric Co.
- Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
- General Electric Co.
- Jeandron, W. J.
- Morganite Brush Co.
- United States Graphite Co.
- Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
- United States Graphite Co.

Brushes, Motor & Generator
- National Carbon Co., Inc.

Brushes, Starting & Lighting
- National Carbon Co., Inc.

Brush Holders
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.

Bunkers, Coal
- American Bridge Co.

Bushings, Case Hardened and Manganese
- Bemis Car Truck Co.

Bushings, Graphite and Wooden
- Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Carbon Brushes. (See Brushes, Carbon

Carbons, Photographic
- National Carbon Co., Inc.

Car Panel Safety Switches
- Westinghouse Elec. & Mfg. Co.

Cars, Dump
- Differential Car Co.

Cars, Passenger, Freight, Express, etc.
- American Car Co.
- Brill Co., The J. G.
- Kuhlman Car Co., G. C.
- McGuire-Cummings Mfg. Co.
- National Ry. Appliance Co.
- Osgood Bradley Car Co.
- St. Louis Car Co.
- Wason Mfg. Co.

Cars, Second Hand
- Electric Equipment Co.

Cars, Self-Propelled
- Electric Storage Battery Co.
- General Electric Co.

Castings, Brass, Composition or Copper
- Ajax Metal Co.
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
- American Bridge Co.
- American Steel Foundries
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Standard Steel Works Co.
- St. Louis Car Co.

Castings, Malleable and Brass
- Amer. Brake Shoe & Fdry Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

Catchers and Retrievers, Trolley
- Ackley Brake & Supply Co.
- Earll, Chas. I.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Wood Co., Chas. N.

Ceiling Car
- Keyes Products Co.

Caustic Soda Cells
- National Carbon Co., Inc.

Checks, Employees
- American Railway Supply Co.

Circuit Breakers
- Cutter Electrical & Mfg. Co., The
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
- Anderson Mfg. Co., A. & J. M.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Eureka Co.
- General Electric Co.
- Hubbard & Co.
- Klein & Sons, Mathias
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
- Brill Co., The J. G.
- Ohio Brass Co.

Clusters and Sockets
- General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Coils, Armature and Field
- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- Diamond Mfg. Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Coil Winding Machines
- Diamond Mfg. Co.

Coin-Counting Machines
- Electric Service Supplies Co.
- International Register Co., The
- Johnson Fare Box Co.

Combustion Systems
- Engineer Co., The

Commutator Slotters
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
- General Electric Co.

Commutators or Parts
- Cameron Electrical Mfg. Co.
- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Mica Insulator Co.
- Westinghouse Elec. & Mfg. Co.

Compressors, Air
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Ingersoll-Rand Co.
- Westinghouse Trac. Brake Co.

Compressors, Gas
- Ingersoll-Rand Co.

Concrete Products
- Massey Concrete Products Corp.

Condensers
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Schutte & Koerting Co.
- Westinghouse Elec. & Mfg. Co.

Conduit Fittings
- Chicago Fuse Mfg. Co.

Conduits, Flexible
- Tubular Woven Fabric Co.

Conduits, Underground
- Western Electric Co.

Connectors, Solderless
- Frankel Connector Co.
- Westinghouse Elec. & Mfg. Co.

Controller Fingers
- Russell Mfg. Co.

Controllers or Parts
- Allis-Chalmers Mfg. Co.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Russell Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

Controller Regulators
- Elec. Service Supplies Co.

Controlling Systems
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Converters, Rotary
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
- Portable Machinery Co.

Conveyors, Coal and Ash
- Green Eng. Co.
- Portable Machinery Co.

Conveyors, Portable
- Portable Machinery Co.

Conveying and Hoisting Machinery
- American Bridge Co.
- Columbia M. W. & M. I. Co.
- Green Eng. Co.
- Portable Machinery Co.

Cooling Systems
- Spray Engineering Co.

Copper Wire
- Anaconda Copper Mining Co.
- Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
- Brill Co., The J. G.
- Electric Service Supplies Co.
- International Register Co., The
- Roebling's Sons Co., John A.
- Samson Cordage Works

Cord Connectors and Couplers
- Electric Service Supplies Co.
- Samson Cordage Works
- Wood Co., Chas. N.

Couplers, Car
- Brill Co., The J. G.
- Gould Coupler Co.
- Ohio Brass Co.
- Westinghouse Trac. Brake Co.

Cranes
- Niles-Bement-Pond Co.
- Toledo Bridge & Crane Co., The

Cross Arms. (See Brackets)

Crossing Foundations
- International Steel Tie Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Frog & Switch
- Wharton, Jr., & Co., Wm.

Crossings, Track. (See Track, Special Work)

Crushers, Lock
- Allis-Chalmers Mfg. Co.

Culvert Pipe, Concrete
- Massey Concrete Products Corp.

Curtains and Curtain Fixtures
- Brill Co., The J. G.
- Edwards Co., The O. M.
- Electric Service Supplies Co.
- St. Louis Car Co.

Cutouts
- Chicago Fuse Mfg. Co.

Cutting Apparatus, Oxy-Acetylene
- Oxweld Acetylene Co.

Dealers' Machinery
- Archer & Baldwin
- Electric Equipment Co.
- Foster Co., L. B.
- Hyman Michaels Co.

Derailing Devices. (See also Track Work)
- Cleveland Frog & Crossing Co.
- Wharton, Jr. & Co., Wm.

Destination Signs
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Detective Service
- Wish Service, P. Edward

Dogs, Lathe
- Williams & Co., J. H.

Door Operating Devices
- Consolidated Car Heating Co.
- National Pneumatic Co., Inc.
- Safety Car Devices Co.

Doors and Door Fixtures
- Brill Co., The J. G.
- Edwards & Co., The O. M.
- General Electric Co.

Doors, Folding Vestibule
- National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
- Ingersoll-Rand Co.

Drills, Track
- American Steel & Wire Co.
- Electric Service Supplies Co.
- Niles-Bement-Pond Co.
- Ohio Brass Co.

Drinking Cups, Sanitary Paper
- Individual Drinking Cup Co., Inc.

Dryers, Sand
- Electric Service Supplies Co.
- Zelnicker Supply Co., Inc., Walter A.

Electrical Wires and Cables
- Roebling's Sons Co., J. A.

Electrodes
- National Carbon Co., Inc.

Engineers, Consulting, Contracting and Operating
- Allison & Co., J. S.
- Archbold-Brady Co.
- Arnold Co., The
- Clark Management Corp., E. W.
- Drum & Co., A. L.
- Engel & Hevenor
- Feustel, Robert M.
- Ford, Bacon & Davis

~for Precision in Test Work

Weston

Model 329

Portable Poly-Phase Wattmeters

These Instruments are striking examples of successful instrument construction. They embody many mechanical and electrical refinements which have resulted in the production of the peerless wattmeter. Being shielded, they may be used in the proximity of stray fields.

Having an accuracy within ½ of 1 per cent of full scale value under normal working conditions, they are excellent working standards as well as test Instruments. They have double current and potential ranges that may be quickly changed. The power consumption is very small.

Their phase angles being exceedingly small, these Instruments may be used on low power factors without appreciable error in the readings.

The current coils have 100 per cent overload capacity. The overload capacity of the Potential circuit is ample and varies with the range. Special Instruments are available for use on very low factors.

Model 329 Portable Poly-Phase Wattmeter

Write for Bulletin 2002

Weston Electrical Instrument Co.
21 Weston Ave., Newark, N. J.

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Chicago
Philadelphia
Boston
Cleveland
Detroit
St. Louis
San Francisco
Denver
Cincinnati
Pittsburgh
Richmond
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Minneapolis
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Jacksonville
Seattle
Toronto
Montreal
Halifax
Winnipeg
Vancouver
Calgary, Alta.

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WHAT AND WHERE TO BUY

Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter.
Jacobs & Co., J. L.
Republic Engineers, Inc.
Richey, Albert S.
Sanderson & Porter
Scofield Engineering Co.
Stone & Webster
White Engineering Corp., The J.G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Engines, Steam
Allis-Chalmers Mfg. Co.

Extension Platform Trap Doors
Edwards Co., The O. M.

Fare Boxes
Brill Co., The J. G.
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.

Feed Water Heaters
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works

Fibre and Fibre Tubing
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
Castle, Inc., James M.

Flashlights
National Carbon Co., Inc.

Floodlights
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.

Flooring, Grating
Irving Iron Works

Forgings
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Funnel Castings
Wharton, Jr., Inc., & Co., Wm.

Furniture, Metal Office
Edwards Co., The O. M.

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Thayer & Co., Inc.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Ackley Brake & Supply Corp.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric Co
Westinghouse Elec. & Mfg. Co.

Gongs. (See Bells and Gongs)

Graphite
Morganite Brush Co.

Grates, Chain
Green Eng. Co.

Greases. (See Lubricants)

Grinders and Grinding Supplies
Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Cattle
American Bridge Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St Louis Car Co.

Headlining
Keyes Products Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Niles-Bement-Pond Co.
Toledo Bridge & Crane Co., The

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Houses, Watchman
Massey Concrete Products Corp.

Hydraulic Machinery
Niles-Bement-Pond Co.

Injectors
Schutte & Koerting Co.

Inspection
Electrical Testing Lab's

Institutions, Educational
Alexander Hamilton Institute

Instruments, Measuring, Testing and Recording
General Electric Co.
Thompson-Levering Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instrument Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Mica Insulator Co.
Sherwin-Williams Co.
Standard Underground Cable Co.
Westinghouse Elec. & Mfg. Co.

Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Mitchell-Rand Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Insulators. (See also Line Material)
Anderson M. Co., A. & J. M.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Hemingray Glass Co.
Ohio Brass Co
Westinghouse Elec. & Mfg. Co
White Electrical Supply Co., T. C.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

Jacks. (See also Cranes, Hoists and Lifts)
Brill Co., The J. G.
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.
Templeton, Kenly Co. Ltd.

Joints, Rail
Reading Specialties Co.
Track Specialties Co.
Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.

Junction Boxes
Standard Underground Cable Co.

Lamp Guards and Fixtures
Anderson M. Co. A. & J. M.
Electric Service Supplies Co.
General Electric Co.
National Electric Specialty Co.
Westinghouse Elec. & Mfg. Co

Lamps, Arc and Incandescent. (See also Headlights)
Anderson M. Co., A. & J. M.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co.

Lightning Protection
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
Anderson M. Co., A. & J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co
White Electrical Supply Co., T. C.

Loaders, Wagon, Truck or Car
Portable Machinery Co.

Locking Spring Boxes
Wharton, Jr., & Co., Wm.

Locomotives, Electric
Brill Co., The J. G.
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Lubricating Engineers
Galena-Signal Oil Co.
Texas Co.
Universal Lubricating Co.

Lubricants, Oil and Grease
Galena-Signal Oil Co.
Texas Co.
Universal Lubricating Co.

Machine Tools
Columbia M. W. & M. I. Co.
Niles-Bement-Pond Co.

Machine Work
Columbia M. W. & M. I. Co.

Machinery, Insulating
American Insulating Machine Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Meters (See Instruments)
Electric Service Supplies Co.

Mica
Mica Insulator Co.

Mirrors for Motormen
Drew Elec. & Mfg. Co.

Motormen's Seats
Electric Service Supplies Co.
Wood Co., Chas. N.

Motors, Electric
Allis-Chalmers Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Motors and Generators, Sets
General Electric Co.

Nuts and Bolts
Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

Ohmmeters
Weston Elec'l Instrument Co.

Oils. (See Lubricants)

Oil Burning Equipment
Schutte & Koerting Co.

Oxy-Acetylene (See Cutting Apparatus Oxy.)

Packing
Westinghouse Elec. & Mfg. Co.

Paints & Varnishes (Preservative)
Ackley Brake & Supply Co.
Sherwin-Williams Co.
St. Louis Surfacer & Paint Co.

Paints and Varnishes (Insulating)
Mitchell-Rand Mfg Co.
Sherwin-Williams Co.

Paints and Varnishes for Woodwork
National Ry Appliance Co.
Sherwin-Williams Co.

Paving Material
American Brake Shoe & Fdry. Co

Pickups, Trolley Wire
Electric Service Supplies Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Wood Co., Chas. N.

Pinions. (See Gears)

Pins, Case Hardened, Wood and Iron
Bemis Car Truck Co.
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Traction Brake Co.

Pipe Fittings
Power Specialty Co.
Standard Steel Works Co.
Westinghouse Traction Brake Co.

Planers. (See Machine Tools)

Pliers, Insulated
Electric Service Supplies Co.

Pneumatic Tools
Ingersoll-Rand Co.

Poles, Posts and Piling (Concrete)
Massey Concrete Products Corp
Southern Cypress Mfg. Assn.

Pole Reinforcing
Hubbard & Co.

Poles, Metal Street
Bates Expanded Steel Truss Co
Electric Railway Equipment Co
Hubbard & Co.

Pole Sleeves
Drew Elec. & Mfg. Co.

Poles, Trolley
Anderson Mfg. Co., A. & J. M
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Electric Railway Equipment Co

Power Saving Devices
Arthur Power-Saving Recorder Co.
National Ry. Appliance Co.

Pressure Regulators
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co

Pumps
Allis-Chalmers Mfg. Co.
Schutte & Koerting Co.

Punches, Ticket
American Railway Supply Co.
Bonney-Vehslage Tool Co.
International Register Co., The
Wood Co., Chas. N.

Purifiers, Feed Water
Scaife & Sons Co., Wm. B.

Rails
Foster Co., L. B.
Lackawanna Steel Co.

Rail Grinders. (See Grinders)

Rail Joint Plates
Lackawanna Steel Co.

Rail Welding. (See Brazing and Welding Processes)
Rail Welding and Bonding Co.

Rails, Relaying
Foster Co., L. B.
Zelnicker, Walter A., Supply Co., Inc.

Railway Safety Switches
Westinghouse Elec. & Mfg. Co.

Rattan
Brill Co., The J. G.
Electric Service Supplies Co.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Recorders, Power Saving
Arthur Power-Saving Recorder Co

Registers and Fittings
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Rooke Automatic Register Co.

Reinforcement, Concrete
American Steel & Wire Co

Repair Shop Appliances. (See also Coil Banding and Winding Machines)
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Repair Work. (See also Coils)
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Replacers, Car
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Reading Specialties Co.

Resistance, Grid
Columbia M. W. & M. I. Co.

Resistance, Wire and Tube
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Retrievers, Trolley. (See Catchers and Retrievers, Trolley)

Rheostats
General Electric Co.
Westinghouse Elec. & Mfg. Co

Rivet Heaters
American Car & Founry Co.

Roofing, Car
Keyes Products Co.

INGERSOLL-RAND

I-R COMPRESSORS & VACUUM PUMPS
"IMPERIAL" COMPRESSORS & VACUUM PUMPS
I-R TURBO BLOWERS
"JACKHAMERS"
"STOPEHAMERS"
I-R ROCK DRILLS
SERGEANT ROCK DRILLS
BUTTERFLY ROCK DRILLS
"IMPERIAL" HAND HAMMER DRILLS
"RADILAX" COAL CUTTERS
"CALYX" CORE DRILLS
ELECTRIC AIR STONE CHANNELERS
I-R DRILL SHARPENERS
I-R OIL FURNACES
I-R DRILL STEEL
"LITTLE TUGGER" HOISTS
"LITTLE DAVID" PNEUMATIC TOOLS
"IMPERIAL" PNEUMATIC TIE TAMPERS
P-R OIL ENGINES
I-R BAROMETRIC CONDENSING PLANTS
I-R LOW LEVEL MULTI JET CONDENSING PLANTS
AIR LIFT EQUIPMENT

PRODUCTS

WHAT AND WHERE TO BUY

Sanders, Track
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Ohio Brass Co.
St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G.

Scrapers, Track. (See Cleaners and Scrapers, Track)

Seats, Car. (See also Rattan)
Brill Co. The J. G.
St. Louis Car Co.

Second-Hand Equipment
Archer & Baldwin
Cleveland Armature Works
Foster Co., L. B.
Hyman Michaels Co
Zelnicker Supply Co., Inc., Walter A.

Shades, Vestibule
Brill Co., The J. G.

Shovels
Brill Co., The J. G.
Hubbard & Co.

Signals, Car Starting
Consolidated Car Heating Co.
Electric Service Supplies Co.
National Pneumatic Co., Inc.

Signal Systems, Block
Electric Service Supplies Co.
Nachod Signal Co., Inc.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Slack Adjusters. (See Brake Adjusters)

Sleet Wheels and Cutters
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
More-Jones Brass & Metal Co.
Nuttall Co., R. D.

Snow-Plows, Sweepers and Brooms
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Fender Co.
McGuire-Cummings Mfg. Co.

Soldering and Brazing Apparatus. (See Welding Processes and Apparatus)

Solderless Connectors
Frankel Connector Co.

Spikes
American Steel & Wire Co.

Splicing Compounds
Westinghouse Elec. & Mfg. Co.

Splicing Sleeves. (See Clamps and Connectors)

Spray Nozzles
Schutte & Koerting Co.

Springs, Car and Truck
American Steel Foundries
American Steel & Wire Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.

Sprinklers, Track and Road
Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Steel Castings
Wharton, Jr., & Co., Wm.

Steps, Car
American Mason Safety Tread Co.
Irving Iron Works
Universal Safety Tread Co.

Steps, Ladder and Stair (non-slipping)
Irving Iron Works

Steps, Safety
Irving Iron Works

Stokers, Mechanical
Babcock & Wilcox Co.
Green Engrg. Co.
Westinghouse Elec. & Mfg. Co.

Storage Batteries. (See Batteries, Storage)

Strand
Copper Clad Steel Co.
Roebling's Sons Co., J. A.

Structural Steel
Lackawanna Steel Co.

Subway Grating
Irving Iron Works

Superheaters
Babcock & Wilcox Co.
Power Specialty Co.

Sweepers, Snow. (See Snow Plows, Sweepers and Brooms)

Switch Stands
Indianapolis Switch & Frog Co.
Ramapo Iron Works

Switches, Track. (See Track Special Work)

Switchboxes
Chicago Fuse Mfg. Co.

Switches and Switchboards
Allis-Chalmers Mfg. Co.
Anderson Mfg. Co. A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Synchroscopes
Weston Elec'l Instrument Co.

Tampers, Tie
Ingersoll-Rand Co.

Tanks, Ash and Coal Storage
Green Engineering Co.

Tanks, Oil Storage
Milwaukee Tank Works

Tapes and Cloths. (See Insulating Cloth, Paper and Tape)

Telephones and Parts
Electric Service Supplies Co.

Terminals, Cable
Standard Underground Cable Co.

Testing, Commercial and Electrical
Elec'l Testing Laboratories

Testing Instruments. (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
Railway Utility Co.
Smith Heater Co., Peter

Ticket Choppers and Destroyers
Electric Service Supplies Co.

Tie Plates
Lackawanna Steel Co.

Ties, Mechanical
Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
American Bridge Co.
Barbour-Stockwell Co.
International Steel Tie Co.

Ties, Wood Cross. (See Poles, Ties, Posts, etc.)

Tongue Switches
Wharton, Jr., & Co., Wm.

Tool Holders
Williams & Co., J. H.

Tools, Thread Cutting
Williams & Co., J. H.

Tools, Track & Miscellaneous
American Steel & Wire Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Hubbard & Co.
Klein & Sons, Mathias
Railway Track-work Co.

Torches Acetylene (See Cutting Apparatus)

Tower Wagons and Auto Trucks
McCardell & Co., J. R.

Towers and Transmission Structures
American Bridge Co.
Archbold-Brady Co.
Bates Expanded Steel Truss Co.
Westinghouse Elec. & Mfg. Co.

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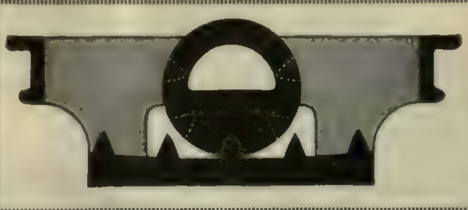

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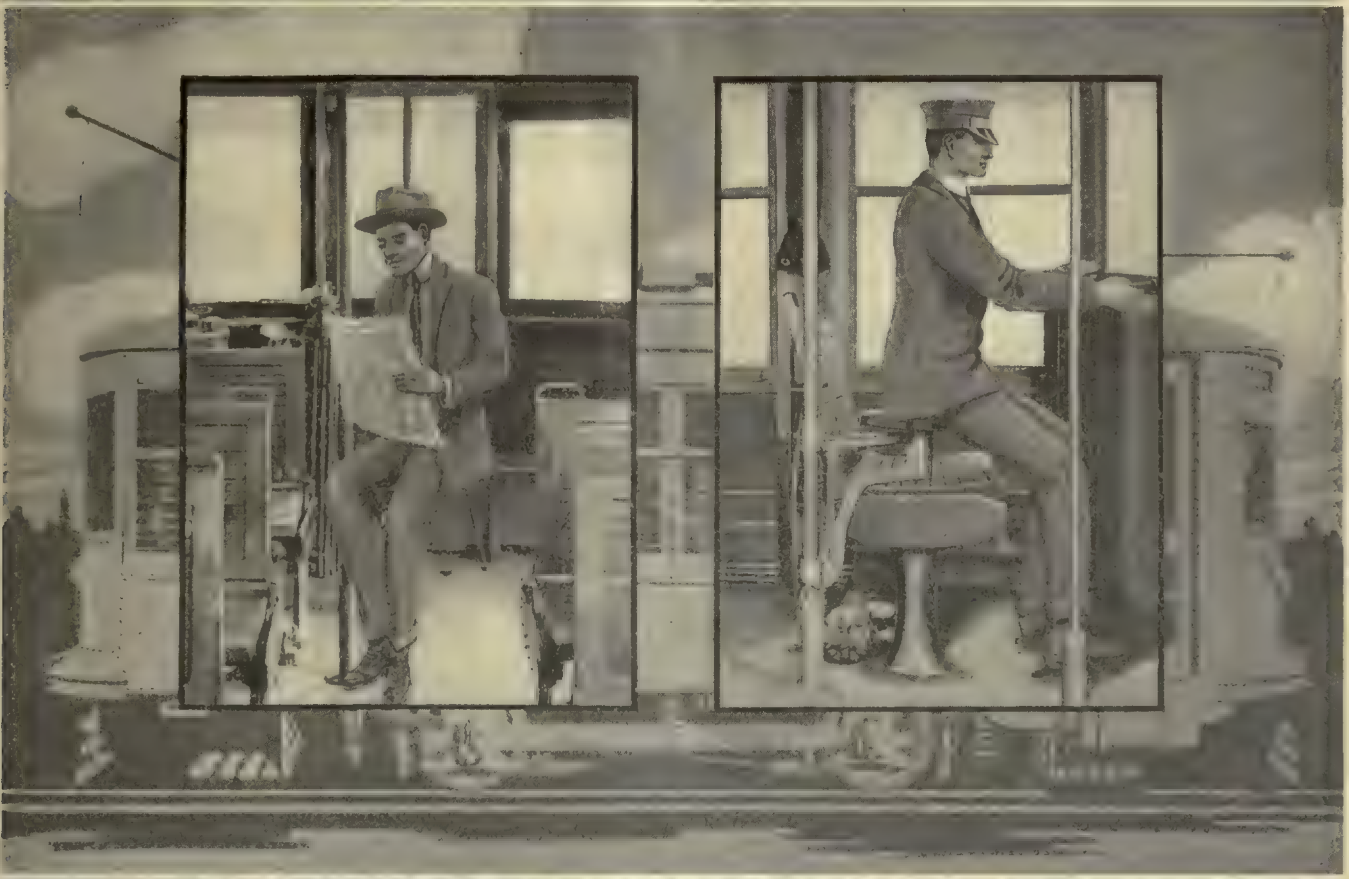

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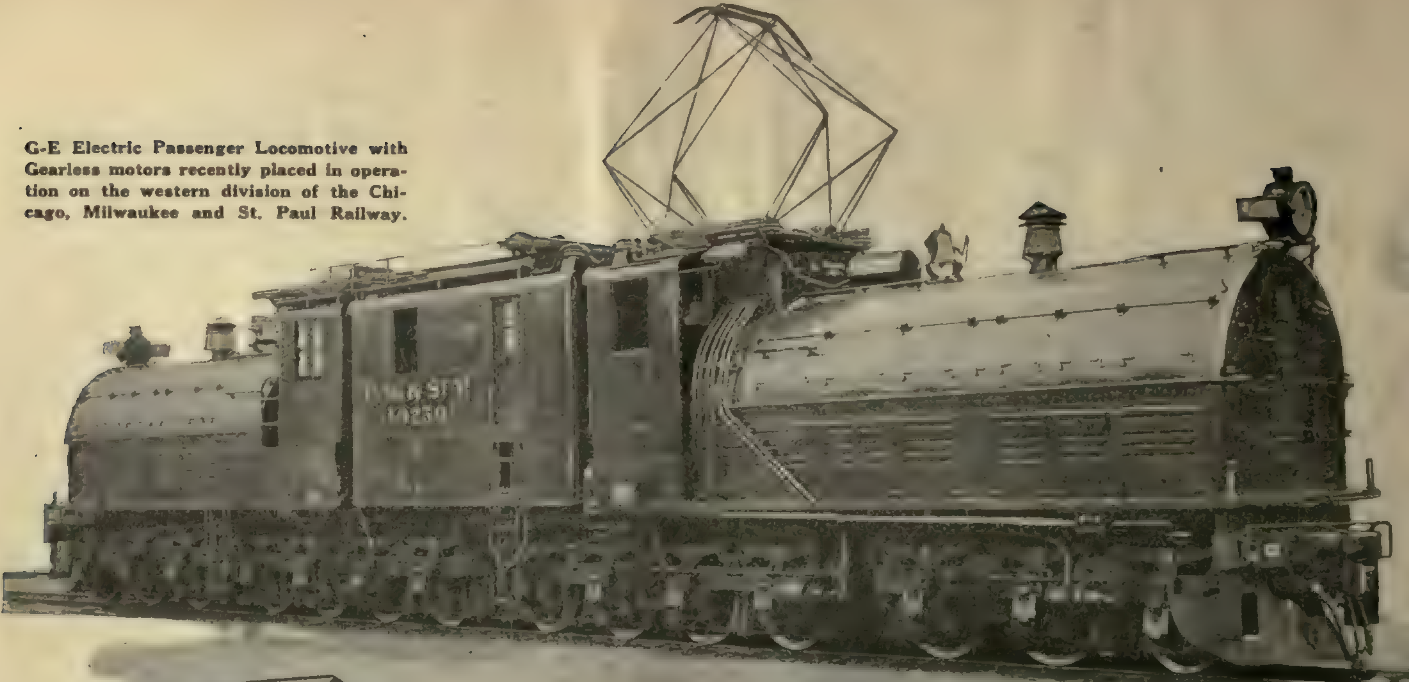

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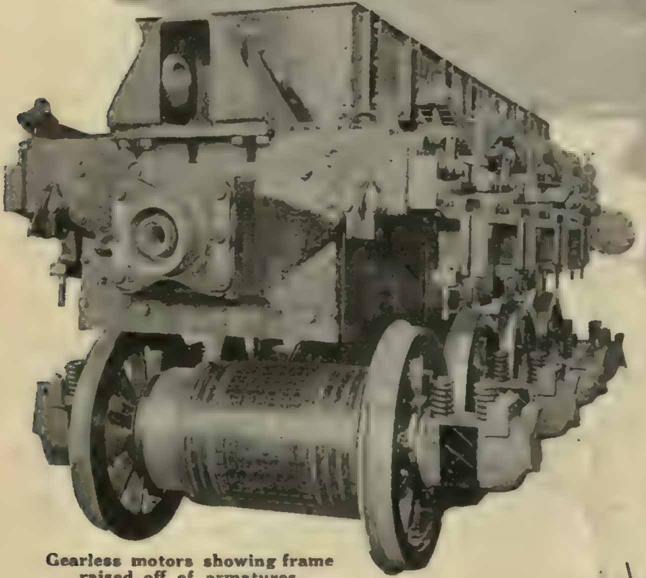

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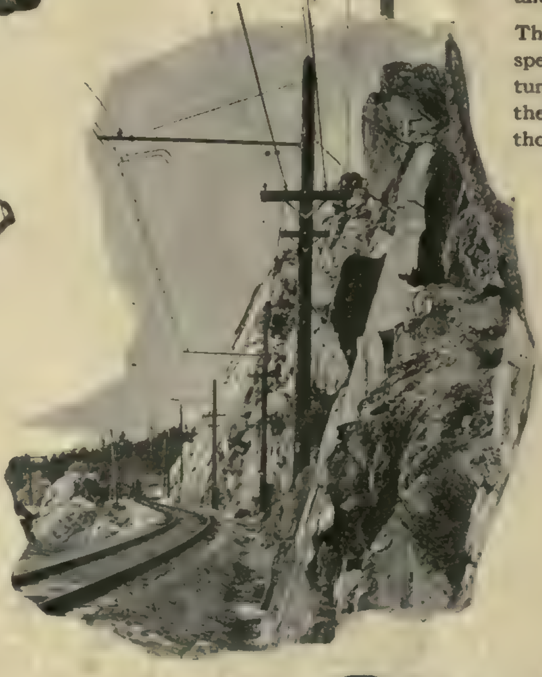

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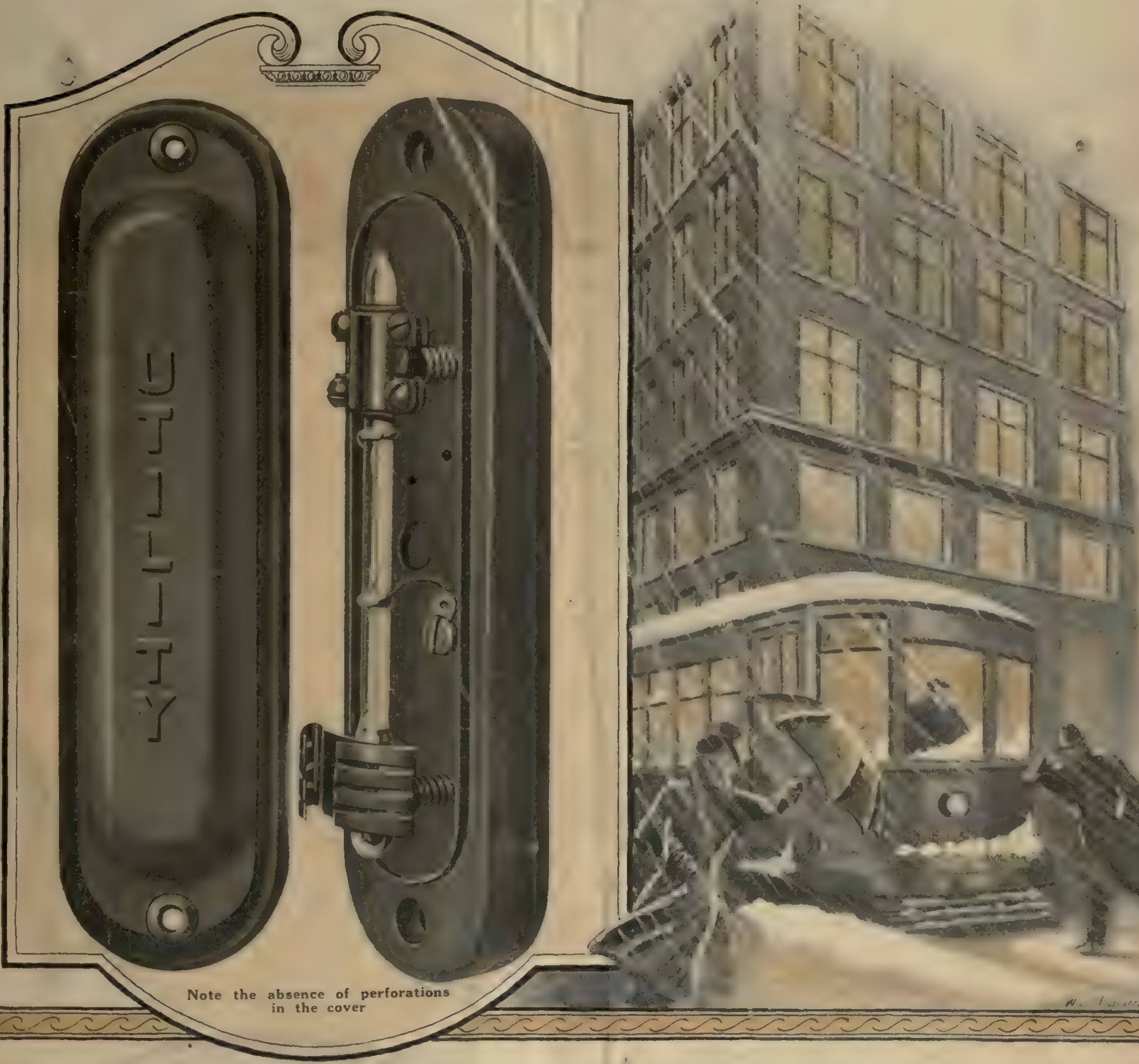

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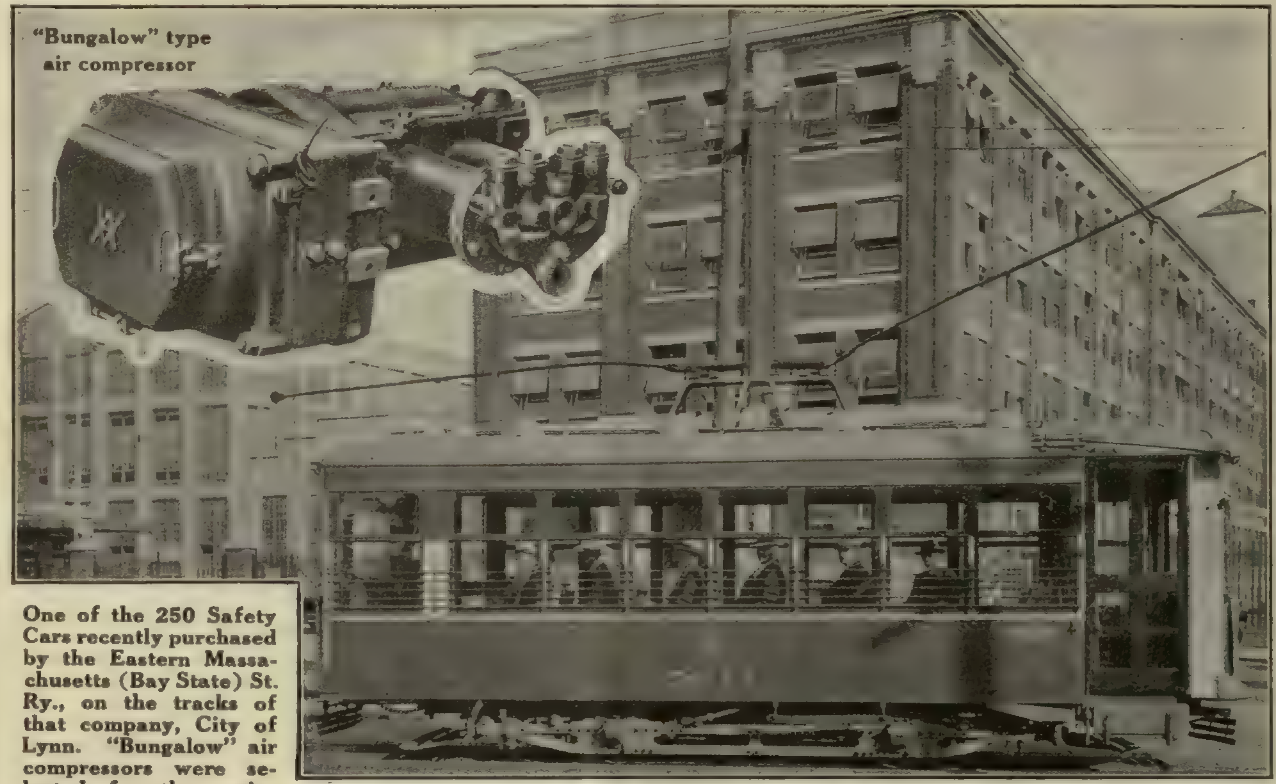

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During the busy day the Tacomans resort here for business; in the evening for pleasure.

So Ninth Street and Broadway is a busy center at all times with plenty of car movement—more than ever in fact since the shorter-headway safety car came along.

Naturally, an intersection like this is put up with Phono-Electric Trolley Wire, because The Tacoma Railway and Power Company wanted a wire that would stay put and stay up.

Phono-Electric does!

Bridgeport Brass Company

Bridgeport Connecticut

3324

You Are Paying More for Poor Bonding Than Good Bonding Costs

It looks like money saved to let bonding slide.

Actually it is extravagance.

At every poorly bonded joint voltage drops and power is consumed.

Your power costs wipe out the money saved on bonding.

Burnt-out armatures—the result of low voltage—keep skilled workmen busy.

Cars—starved as to voltage—operate slowly and service suffers.

"The Return Circuit" explains every phase of rail bonding and its effect on operation. It's interesting—and free.

O-B Bonds are Good Bonds

A few typical O-B Bonds are illustrated here. There is one O-B Type just right for your road.

Type AW-3 Bond for Ball of Rail
Also made for Base of Rail

O-B Arc Weld Bond

Type ST-2 Bond

One of the three types O-B Gas Weld Bond

Type F-3 Bond
Concealed Type of Bond, installed under splice bar

Type E-2 Bond
A long bond for around the splice bar. Especially valuable on joints where rail movement is considerable.

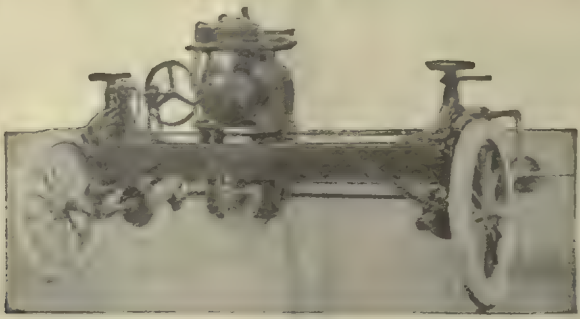
O-B Stud Terminal Bond. Made with either compressed or pin expanded terminals.

THE OHIO BRASS COMPANY, Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago
Los Angeles San Francisco Paris, France

Manufactures Trolley Materials, Rail Bonds, Car Equipment, Hi-Tension Insulators, Third Rail Insulators.

THE SOLUTION OF YOUR TRACK GRINDING PROBLEMS



The solution of your track grinding problems lies in the continued use of one or more of the three Railway Trackwork Company's grinders.

If your rail is giving trouble from corrugations or badly cupped joints, the Reciprocating Track Grinder will best serve your needs.

If you are making extensive track repairs with an arc welding set, the Atlas Rail Grinder is essential for removing the surplus metal used in building up the low joints.

If you desire the best that is to be obtained in a grinder of the grinding wheel type and one that is up-to-date and reliable, specify the Universal Rotary Track Grinder.

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia

Exclusive Agents—West

ATLAS RAILWAY SUPPLY CO.
Chicago, Ill.

ELECTRICAL ENGINEERING & MANUFACTURING CO
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CHAS. N. WOOD CO.
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc.
77A Queen Victoria St., E. C.
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63% for Bearing and 37% for Reinforcement

IN Steel Twin Ties the economical distribution of Steel under the work a tie is called on to do takes these percentages.

The larger proportion of the Steel goes into the Three-Foot by Thirteen-Inch Bearing Plates, which are Five-sixteenths Inch thick. Flanged sides provide for stresses in the plates and in combination with the Three-Foot-Long Bearing utilize all the Steel in them.

The smaller, but equally important, proportion goes into the Three-Inch Channels, which weigh Four Pounds to the foot.

They space the rail so accurately that no gauge is needed in laying Steel Twin Ties.

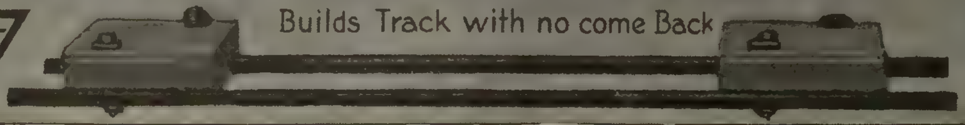
They also reinforce the track foundation at Three-Foot Intervals.

This efficient distribution of Steel is the fundamental principle of permanent, proved construction at less first cost than wood tie probabilities.

The International Steel Tie Company
Manufacturers of Steel Twin Ties and Crossing Foundations
16702 Waterloo Road CLEVELAND, O.

Steel Twin Tie Track

The RESILIENT RAILWAY TIE



Builds Track with no come Back

Concrete was never accused of having the property of

Resiliency

yet as a track foundation "it has its points."

You can put resiliency into this most excellent of road beds by the use of Dayton mechanical Ties.

The Asphalt cushion in this Resilient tie dissipates the shock of heavy traffic, and makes riding on concrete as easy as on pneumatic tires.

It's the Tie that does it.

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

These Keystone Specialties are Standard Equipment on nearly all Safety Cars.

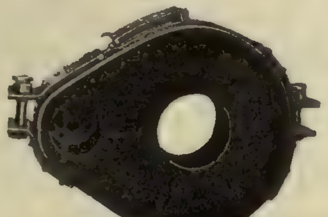
Golden Glow Headlights

Keystone Rotary Gongs

Keystone Air Sanders

Keystone Trolley Catchers

Faraday Car Signal Systems

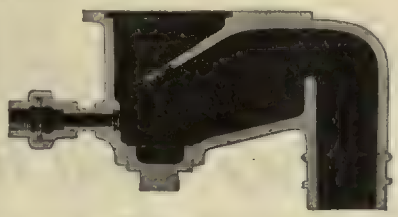

Keystone Steel Gear Cases

Keystone-Hunter Destination Signs

Always specify them for they will serve you well. Write for Bulletin No. 167, showing many other Keystone specialties for use on safety cars.

Keystone Air Sanders

Keystone Air Sander


Cross Section View of Keystone Air Sander

Vastly better than the old box with a pipe through the floor.

These improved traps operated on the brake air line enable the motorman to "shoot" a charge of sand to the contact point of wheel and rail quickly and positively. Safety, economy of time and sand are assured and there is nothing in the apparatus to wear or get out of order. They are made of malleable iron, cast in one piece with a shelf to carry the weight of sand and keep it from packing. A plug in the bottom provides for cleaning. The spouts have two lugs to attach the wire hose to lead the sand to the rail.

ELECTRIC SERVICE·SUPPLIES Co.

Manufacturer of Railway Material and Electrical Supplies

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17th and Cambria Streets

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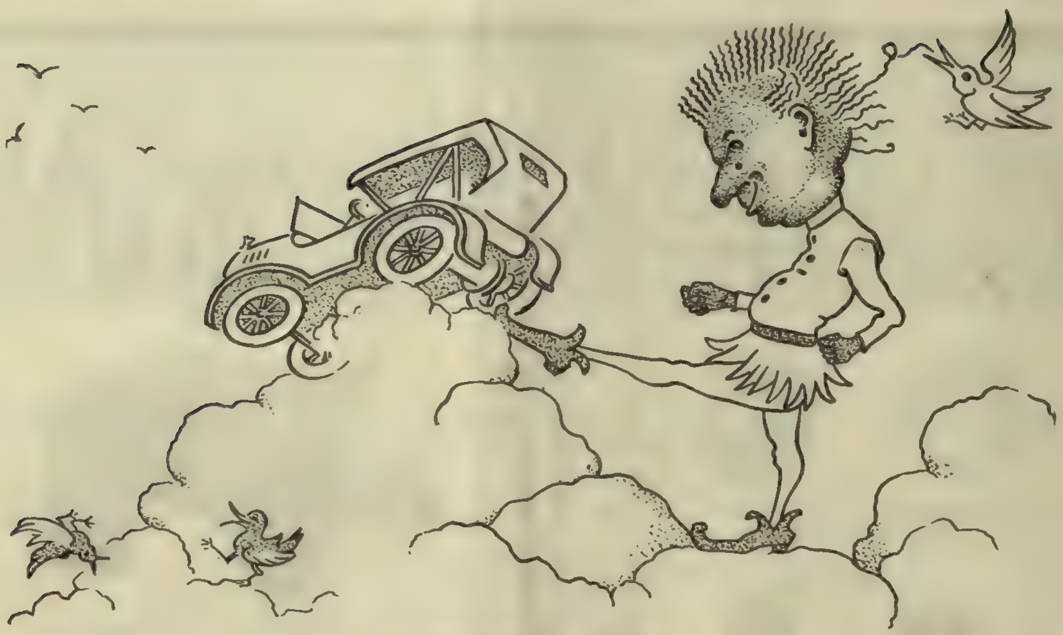
50 Church St.

CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto



CHAPTER TWENTY

THE ALL-*BUT* PERFECT STATE

They Shall Receive a Fair Fare

There was a time when the "jitney" was feared as a parasite competitor—a possible disturber of the All-But Perfect State of Transportation.

But the hard school of experience has shown the "jitney" that it just doesn't belong, while the vision and foresight of our railway operators have made the real motor bus an ally of the electric car in the transportation scheme.

In the All-But Perfect State there may be two types of transportation—the electric road and its auxiliary, the motor bus. But there will be only one organization—the electric railway company.

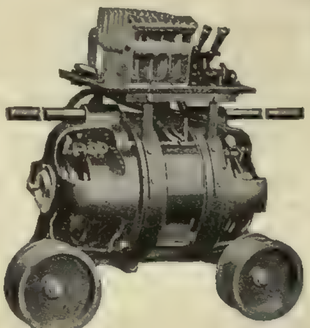
Thus we will have the electric road run as an electric road should be run, with all the wastes plugged and the motor bus so controlled as to render only good to the transportation scheme.

There shall not be even a drop of dew on the financing—nor a lost watt on the line and because of just that, they shall pay their way.

The work of officials in the railway field will be to rid it of the tares and be satisfied with fares.

A bad bond put in good condition is equal to doubling the fare on one passenger—and there are about as many bonds on any line as there are regular riders.

Commissions may prevent them from doubling fares—but they can't prevent them from bonding with a Dynamotor and getting the same effect.



READING NUMBER TWENTY

Q. You are always talking about bonding with the Dynamotor. Has it no other uses?

A. Sure, it has—welding in the shop—welding rails—reclaiming the scrap pile—but we put the hard pedal on bonding because no method has yet equaled the process it uses.

Rail Welding and Bonding Company

Formerly The Lincoln Bonding Co.

RWB

Cleveland, Ohio.

Look 'em over

at Atlantic City

National Pneumatic "Rushour" Devices
including the startling

Multiple-Unit Door Control

During Convention Week there'll be a first-rate chance for you to get into personal touch with the complete National Pneumatic "Rushour" line, from Door and Step Operating Mechanisms to the last word in train operation—Multiple-Unit Door Control!

National Pneumatic Company, Inc.

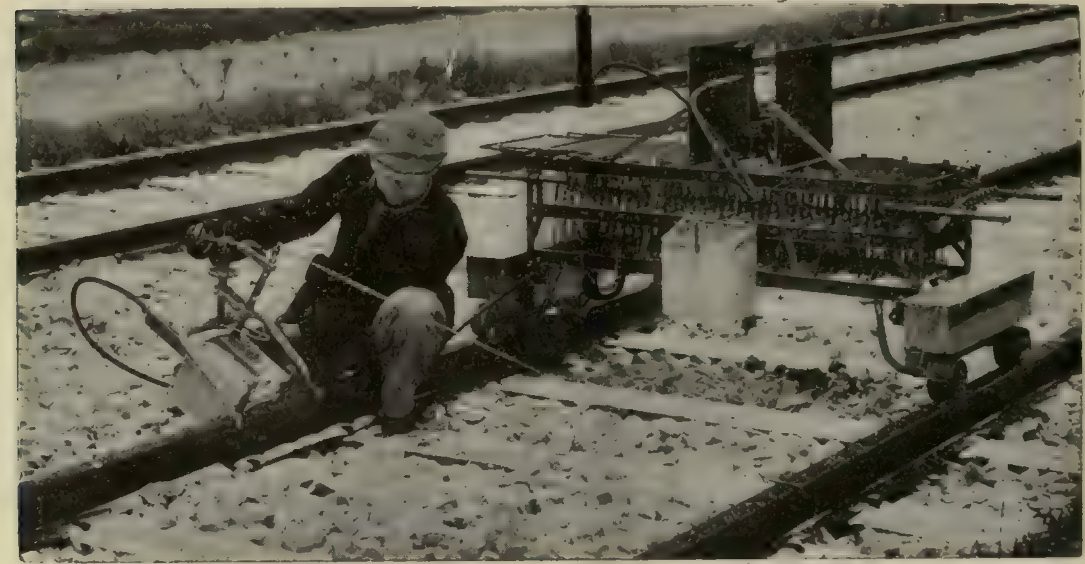
50 Church St., New York   Edison Bldg., Chicago
Works: Rahway, N. J.

The ERICO

Portable Railbonding Apparatus

FOR straight away railbonding or for pick up work along the line you'll find the Erico the logical outfit for speed and convenience.

The welder weighs but 65 pounds and the entire outfit only 200 lbs. Two men can handle it easily, lifting it off and on the track as often as necessary. And as many as 120 bonds can be easily welded in an average eight hour day, one man performing the actual bonding and one doing the preliminary work.

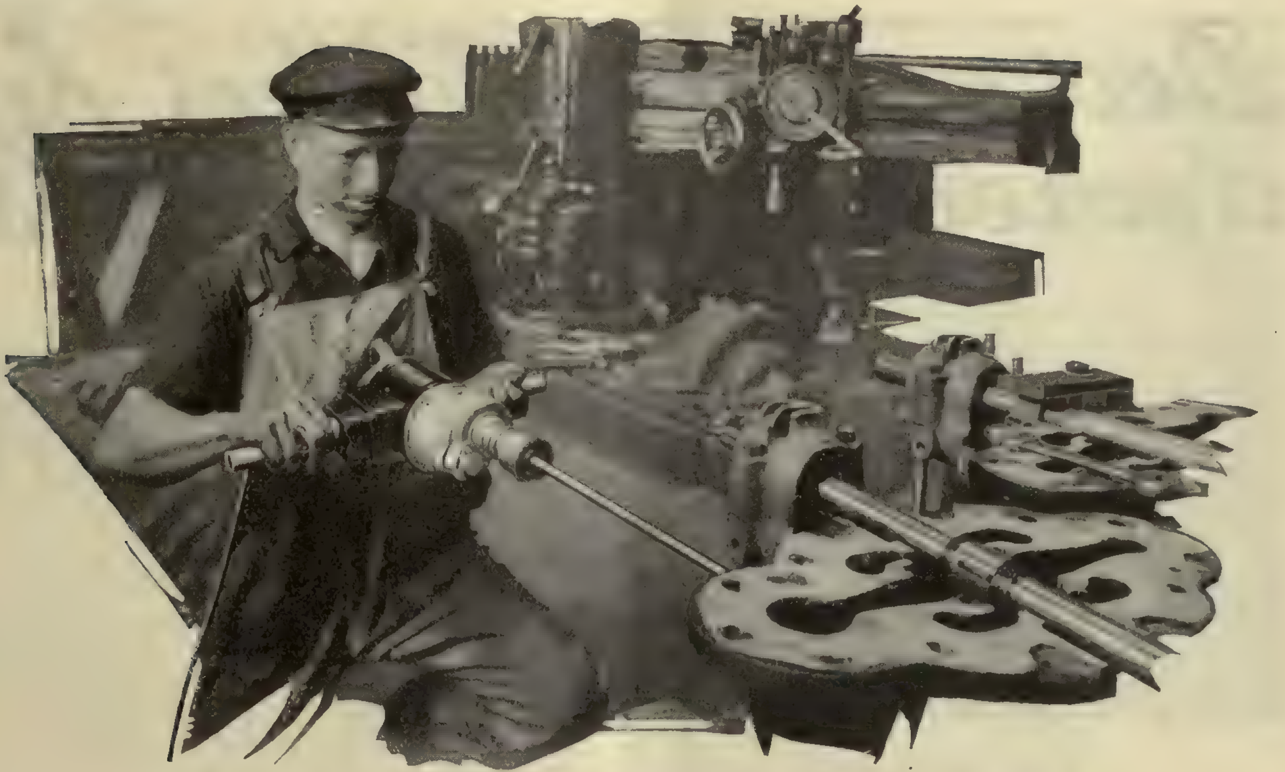


Write today

for complete data on the Erico. Put it to work and it will save time and money for you.

The Electric Railway Improvement Co.

Cleveland, Ohio



Not cheaper drills—but cheaper *drilling!*

LOWER-COST-PER-YEAR performance records prove that for length of service and over-all operating economy, Little Giant Portable Electric Drills *stand alone.*

The same design that withstands the severe strains of shipyard and other heavy drilling service, is duplicated in *every* Little Giant, large or small.

Big-calibre engineering design necessary to meet big-user demands for productive efficiency, benefits *alike* the small shop, factory or assembly plant.

Whether you use one or one hundred Little Giants, each drill is backed by *direct personal-touch* service, with stocks of new tools and spare parts at Company Branches. This service "keeps drills drilling."

Little Giant Electric Tools are made for operation on any current and in many sizes and types. Ask for Booklet 397.

Chicago Pneumatic Tool Company
Chicago Pneumatic Building · 6 East 44th Street · New York
Sales and *Service Branches all over the World

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EL-24

BOYER PNEUMATIC HAMMERS · · LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS
CHICAGO PNEUMATIC AIR COMPRESSORS · · VACUUM PUMPS · · PNEUMATIC HOISTS
GIANT OIL AND GAS ENGINES ROCK DRILLS · · COAL DRILLS

CHICAGO CP PNEUMATIC

LITTLE **GIANT**
Electric *Tools*

Decrease Liabilities by decreasing free rides

Every time a man boards one of your cars, slips through the crowd while your conductor is juggling dimes, nickels, pennies and transfers—every time this happens your liability curve goes up.

Individually a free ride—a lost fare—doesn't amount to a whole lot, but in the *aggregate* they represent a loss of revenue that should not be tolerated.

And since these lost fares are due largely to the inability of a conductor to handle large crowds with only two hands to make change and issue transfers, it is up to you to give him the means of making fare collection a positive, accurate and mechanical proposition.

This is best accomplished with Johnson Fare Boxes and Johnson Metal Tokens—a combination that is speeding up schedules, improving service and increasing revenue through collecting the fares formerly lost in more than 200 of the country's electric railways.

They'll do the same for you. Write to our engineering department today for all the facts.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

TAKE IT FROM THE MAN WHO KNOWS

G A L E N A
QUALITY

Railway lubrication is not a *side line* with this company; it is a *specialty*—a business built upon the knowledge and experience of over a half century of test and research.

Galena Quality Oils and Galena Service are daily proving their value on hundreds of the electric railways of America by making possible an operating efficiency that is unattainable without perfect lubrication. The economy of Galena scientific methods is shown by increased mileage, preservation of bearings and equipment, and the elimination of the expensive repairs that are inevitable with faulty lubrication. There is not a single instance of competitive test in which Galena Quality Oils have failed to prove conclusively their ability to give maximum service at minimum cost.

Galena Quality is Our Bond
and Your Security!

Galena-Signal Oil Company

New York *Franklin, Pa.* *Chicago*
and all principal American cities
LONDON TORONTO BUENOS AIRES MONTREAL PARIS

Protection that increases the life of any installation is not only direct economy but aids a wise conservation of materials and labor.

A group of electric sherardizing ovens

One of the buildings devoted to the manufacture of G-E Line Material

What Sherardizing means to your overhead

G-E electric oven sherardizing means long life to your overhead construction. Line material sherardized by the exclusive G-E process will resist rust to a surprising degree.

G-E sherardizing forms a coating that extends below the surface forming an integral part of the device so treated. Chipping or scaling is absolutely impossible.

See our test of G-E sherardizing at the A. E. R. A. Convention next month. It will convince you that G-E sherardized line material is the right kind for your overhead construction.

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Schenectady, N.Y.

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all large cities

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 56   New York, Saturday, September 25, 1920   *Number* 13

What About the Federated American Engineering Societies?

AS ANNOUNCED on another page of this issue, the first meeting of American Engineering Council, the functioning organization of the Federated American Engineering Societies, has been called for November. As to what the significance of this new organization is, we have already expressed our personal belief, strengthened by the opinions of others with whom we have come in contact. This council, representing, as it is designed to do, all engineering organizations in the country, should be effective in the councils of the nation in connection with all matters where an engineer's voice should be heard. It has already been said that "Wherever you look you see the work that the engineer has done," and it is important that the engineer be heard.

With this meeting approaching, there is presented to each electric railway engineer the question as to what the American Electric Railway Engineering Association should do and what the local engineering associations, to which so many belong, should do. The Engineering Association and the local engineering societies have received invitations to join the Federated Societies. They must decide what action to take. If they are going to join, and we hope they will and believe they should, they should do so now and be represented at the first meeting.

At the October convention of the Engineering Association it seems probable that the matter will be up for discussion. It will be up for discussion in local engineering society meetings during the next two months. Engineers should study this matter thoroughly and be prepared to help decide whether the organizations to which they belong will join in this forward step in engineering activities.

Iowans Rejuvenate Association Work

THERE have been evidences during the year of a distinct lack of interest in many of the sectional association meetings, a neglect of committee work and a general tendency to ignore or slight the reciprocal obligations of railway companies which gave rise to the formation of these associations. This trend of association work has taken place at a time when the reason for combining and interchanging ideas for the common good are more important than ever. It may be due to the great stress of work which railway men are under at home, to the fact that the programs in a number of instances have not been such as to attract large attendances, and perhaps, in a measure, on the part of some, to a feeling of discouragement, although we feel that there is really substantial reason for encouragement in the general railway situation. With these things in mind it is most heartening to note the unusual success of the recent Iowa Association meeting at Omaha, which is reported elsewhere in this issue, and to analyze the reasons therefor.

The men who started this association stopped a while back to take stock of their organization. They recalled that it was created for the purpose of combining for protection against adverse legislation and to improve operating conditions through interchange of ideas and experience. As most of the meetings up to this time had been devoted largely to discussions on policy, it appeared that the immediate need of the association was to give greater attention to the operating side. So it was decided that one of the two meetings a year should be devoted entirely to the problems of direct concern to the operating men. The result has been a great revival in interest in the meetings, record attendance, and an invaluable exchange of information. The managers were not there, and consequently there was not the restraint on discussion which is felt by many operating men when the "boss" is present. Apparently the men at this meeting spoke their minds, without hesitation.

Perhaps the signal success of this experiment in the Iowa Association work may suggest the wisdom of following a similar course in other associations in order to arouse greater interest and make the meetings more valuable.

"But It Doesn't Mean Anything"

"RUBE" GOLDBERG is not only a cartoonist extraordinary but also a coiner of winged phrases. One of the latest of these, "But it doesn't mean anything," is about the most apt we can think of in connection with the contradictory interpretations now rampant as to the effect of increased fares on riding. Some say that these increases have produced severe cuts in traffic, and they produce a group of railways to prove their allegation; others say the contrary and trot forth their own little group of railways in rebuttal. Nor does it seem to matter whether logarithmic or man-in-the-street calculations are used by the opposing parties. Each finds just what he hoped to find.

All jesting aside, we believe that in making these studies not enough attention is given to going back of the returns. In one instance, we observed that every time the fare went up the traffic bounded up too. Such a result seemed altogether too utopian. Upon investigation it turned out that the fare increases happened to synchronize with the opening of important extensions to newly developed industries. Hence the results for the system as a whole were surely misleading. At the same time, we were left in the dark as to what happened on individual routes not affected by these new sources of traffic. If we had these data, it would be possible to learn something more definite.

Still, as we pointed out in the issue of Sept. 4 ("Fare Is Not the Only Factor Which Affects Riding"), so many factors are involved that deductions from superficial figures really do not mean anything. Among the questions we might ask in any real study are: What proportion of your riders is helping to keep up the schedule speeds of nickel days by using tokens? What are the relative effects of fare increases on hilly lines, long-haul lines, short-ride business district lines? Are the decreases more pronounced during the hours of voluntary travel than during the (rush) hours of involuntary travel? Have the fare increases been indorsed as just by the entire community or are you suffering from partial boycotting, jitney competition or excessive use of private machines? A study which noted and weighed factors like these would give less occasion to quote another and older gibe: "Figures don't lie, but liars can figure."

Proper Publicity, Its Need and How Shall We Get It?

THE need of publicity work—systematic publicity work—as a means of correctly informing the general public in electric railway matters has been almost universally accepted by managements, at least in theory, and something along this line has been quite generally done. The accomplishment has been great, indeed. But we cannot escape the fact that the accomplishment has not been all that we have desired or would desire. It would be idle talk to say that the publicity work thus far has not attained its mission to an important degree, yet none will contend that there should be any cessation of effort. Rather would it be nearer to the facts to say that only a beginning has been made and that the street and interurban railways have not by any means "put their story over." It has been told in full perhaps in a few places, but it has been learned in full in probably no place.

How great is the need for a new kind of publicity, for a more comprehensive and dramatic effort to make the public understand, is indicated in this recent statement of John J. Stanley, president of the Cleveland Railway, which is probably in less trouble and is in better condition than almost any other railway in the country and which operates in a city where the people are unusually well informed on street railway matters:

> The report of the Federal Electric Railways Commission will help the industry if the country is sufficiently interested to heed it. . . . How the public generally is to be brought to a full realization of its transportation needs and costs I do not know, unless the complete breaking down of service throughout the country carries home the lesson.

Let us hope the latter is not necessary. The railways do not wish to repeat the experience of the railroads, though they may be close to doing so. What can be done to make our publicity efforts more successful? Thus far our publicity work has been conducted almost wholly through the printed word. Without discounting its effect, but rather with encouragement to keep this work up, to the limit, it is only fair to recognize that publicity machinery advances with new inventions and developments the same as all other machinery and use should be made of these latest methods.

What, then, is the next step? We don't pretend to know. But we do believe the answer to the question is of vital importance to the industry. The good work that is done in any one place should be told for the benefit of all. Discussion of ways and means of effecting proper publicity for the industry, as a national proposition as well as for local needs, is important, and is doubly important now, when in many states legislation affecting electric railways and public utilities in general is expected during the next legislative session. The public and the railways need a thorough understanding and it is up to the railways to see that it is gained. The question, again, is how?

In order to bring to a focus, or at least to assist in so doing, the exchange of opinion and information along this line the ELECTRIC RAILWAY JOURNAL plans, and starts in this issue, to devote even more attention than in the past to this subject. We recognize that there are at least two kinds of publicity; the one directed toward having the public understand the story of the railways, as analyzed by the Federal Electric Railways Commission, for example; the other directed toward the local problems of "Merchandising Transportation." But a local publicity campaign must do both if the ends sought are to be obtained.

This week, among other items, there is an editorial suggestion which is intended to elicit some discussion, if no more. We hope that our readers will make contributions to this paper in the way of stories of what they are doing in publicity work and also in the way of suggestions and comments. Through free criticism and approval, ideas crystallize and plans formulate into action. And publicity action is what is needed.

A Hundred Years of Joint Application of Electricity and Magnetism

THE electric railway industry owes its existence to a series of scientific discoveries made early in the nineteenth century, several of the most important of these having occurred just one hundred years ago. Exactly a century earlier than the day on which this issue of the ELECTRIC RAILWAY JOURNAL is mailed to its readers, *i.e.*, on Sept. 25, 1820, a French scientist-teacher announced the discovery of the laws governing the mechanical reaction of one wire carrying a current upon another. This was André Marie Ampère, whose name has been popularized by association with the practical unit of electric current. A week earlier he had called attention to the laws of mechanical reaction between a wire carrying current and a magnetic field.

Ampère was the skilled analyst who studied and extended the discoveries of another teacher-scientist, Hans Christian Oersted of Copenhagen, Denmark, who published results of his research in this field earlier in 1820. Oersted deserves and receives the credit for making the astounding discovery that electricity and magnetism have something to do with each other. Knowledge of this fact is now so commonplace that it is difficult to comprehend a period in which these two physical entities were supposed to be unrelated. From the ages of antiquity up to the years just preceding 1820 the curious effects of lodestone upon pieces of iron, and certain "galvanic" and static effects of electricity were known and utilized, partly for practical, but more largely for entertainment and scientific purposes. The mariner's compass was the principal useful application of the knowledge of magnetism, the lightning rod that of static electricity and the electric primary battery that of current electricity.

The work of Oersted, Ampère and their contemporaries promptly bore fruit in practical invention in several fields. It was but a few years until the electric motor was invented and applied to the stationary and railway power fields. But invention along power-producing lines lagged behind utilization, or the electric railway would have been made commercially successful much earlier than it was.

Historical detail is of interest only to the specialist, but every man whose bread and butter (not to mention cake) are derived from the electric railway business owes at least a grateful thought, this centenary year, to the pioneers who laid the foundation for his success.

Confiscation Will Not Be Allowed

UTILITIES must be allowed "proper opportunity for an adequate judicial hearing as to confiscation," according to a recent opinion of the United States Supreme Court. The case in question is the Ohio Valley Water Company vs. Ben Avon Borough, in which the Pennsylvania Public Service Commission had allowed a valuation of $924,744; the Superior Court had reviewed the record, appraised the property at $1,324,621.80 and remanded the proceeding; the State Supreme Court had reversed the Superior Court, holding that it had no right to make a "substitution of the former's (the court's) judgment for that of the commission," but that it should have confined itself to questions of legality of procedure and competency of evidence. The Federal Supreme Court, using the phrase quoted in the first sentence, then reversed the State Supreme Court and remanded the cause. As a result the State Supreme Court has now sent the case back to the Superior Court with instructions to "determine, upon its own independent judgment as to the law and facts involved, whether the order of the commission is confiscatory" and to make satisfactory disposition of the case in accordance with the Federal court's opinion.

Without remarking on the technicalities of the opinion introduced by the particular state laws, which do not, however, affect the fundamental philosophy or law of the case, it appears that there has been thus definitely established the unassailable right of utilities to have a fair and final judicial hearing on questions of fact of valuation where confiscation is alleged in the figures set by commissions.

We have always hoped that commissions would grow more and more to draw to themselves that same quality of respect and almost reverence that is given to the courts of the country as a whole; that they would eventually become so organized as to personnel, tenure of office, etc., that they would be on a par with courts in the public's esteem. But even so, they might still make errors of judgment in decisions which should be subject to the same review as those of courts.

Now, as appeals from confiscatory rulings will certainly be made in the future upon the basis of this decision, it appears to us that there may be many beneficial results in the line of still further clarifying, from a judicial standpoint, what properly belongs in a valuation. As appeals are made, the decisions from time to time must increasingly deal with the question as to whether the inclusion or exclusion of certain items or as to whether the use of this basis or that basis of arriving at certain figures is confiscatory or not. So that ultimately there will be more clearly formulated the attitude which must be taken with respect to valuation items now most debatable.

But, of course, most important is the assurance that the Supreme Court holds open the door for the correction of mistakes which would involve confiscation of property devoted to the public use.

A Whole City Shares This Shame

"BARON" NELSON is dead, but his soul goes marching on in the Kansas City *Star*. The pet aversion of the "Baron" during his direction of the paper was the Kansas City Railways and its predecessor, the Metropolitan Street Railway. He could find no good in them. His pen was ever against the company and those who manage it. Since his death the tirades have been less frequent, but the work seems to have passed on to those he left behind.

The latest occasion for badgering is the receivership. Nearly all the crimes on the corporation calendar are charged against the company by the *Star*. None of us is perfect, but surely the Kansas City Railways is not entirely bad. Most certainly the last thing the company desired was a receivership. The simple facts are that material and labor costs to the railway in Kansas City, as elsewhere, have increased faster than has relief in the shape of increased fares. In short, in three years expenses of the Kansas City Railways have increased more than 110 per cent whereas fares have increased only 48 per cent. In July the cost of coal was $75,000 more than in May. In addition, jitneys have been taking about $3,000 a day revenue from the company. These things, however, mean nothing to the *Star*. It sees only a "monopolistic business in which the people have no confidence." On the other hand, the *Journal* of the same city much more aptly says that "the very fact that the courts have been appealed to reflects seriously upon the community as a whole."

The *Star* refers felicitously to Cleveland. Cleveland has done well, but then Cleveland has no corporation baiting influence such as the *Star* wields. Moreover, Cleveland has no jitneys. The receipts of this pest alone, for the first six month of the year, if diverted to the Kansas City Railways, would have been sufficient to meet the interest charges of the railway there. It is perhaps too much to expect the *Star* to be fair to the Kansas City Railways, but the fact remains, as the Kansas City *Journal* points out, that communities do not thrive on receiverships and no amount of camouflage or vituperative "corporation baiting" can disguise the fact that Kansas City suffers materially in the eyes of the financial and business world when it drives its street railway industry into a receivership.

This issue contains the program for the Atlantic City Convention, October 11-15.

Next week we shall publish our annual convention issue. The subject selected for this number is **"Mass Transportation,"** and different phases of this topic are treated by authorities in the industry.

Labor-Saving Devices in Use at Cleveland

COMPLETE CONCRETE MIXING MACHINE IN ACTION

FILLING THE POCKETS BY MACHINE IS AN EASY JOB

THE MEN REST WHILE THE MACHINE DOES THE WORK

THE DUMPING PROCESS IS SMOOTH BUT PROMPT

TRANSPORTING A POLE IS SIMPLE FOR THE CRANE AND SETTING IT IS JUST AS EASY

These views, taken recently, illustrate ways in which construction and maintenance costs are being controlled by the Cleveland Railway. This company has long been a consistent advocate of the policy of using machinery wherever practicable and its work is of such magnitude that investment in special as well as standard machines is warranted. These machines would be useful on smaller roads also.

Outdoor Machines Save Money in Cleveland

The Cleveland Railway Uses an Increasing Number of Labor and Time-Saving Devices, Particularly for Track and Line Work—The Latest of These Are Unique

IN NORMAL times the track rehabilitation and extension program of the Cleveland Railway calls for 20 miles or more of new track annually. The present track mileage is more than 350. The magnitude of the annual work necessitates the extensive use of machines, many of which are original with C. H. Clark, engineer maintenance of way.

The Clark pavement plow is one of the best known of these. This device, which loosens the paving blocks between the rails at a rate of 3 or 4 m.p.h., has been in successful use for years and its operation is spectacular in the extreme. A story is told of a manager who wished to see a demonstration of the loosening of some pavement by the plow, but, arriving a few minutes late, found the pavement already in furrows and the blocks being tossed into waiting cars. It is so difficult for a visitor to Cleveland to catch the plow at work that the Cleveland Railway has had a motion picture film prepared to show how it, as well as other mechanical devices used on the system, actually performs. The equipment used previous to the current year has been covered in articles in this paper from time to time.* The present article deals with the latest additions.

THE CRANE FLITS SWIFTLY FROM JOB TO JOB

THE ELECTRIC SHOVEL LEADS THE WAY

The concrete mixing machine shown in several accompanying illustrations is one of Mr. Clark's latest inventions. It was designed with three purposes in view: (1) To insure uniformity in size of the batches; (2) to render equal the amounts of work done by all of the men who charge the machine; (3) to minimize the amount of labor required. The machine consists of two bins for the materials, each divided into four pockets, with an elevating and dumping arrangement for the bins and a horizontal belt conveyor for transferring the batch to the mixer. In the loading position the front edge of the bins is within 8 or 10 in. of the ground, so that a very short lift is necessary in filling them. The inclined elevator guides are supported by a triangular framework built up of structural steel shapes and up these the bins are hauled and are dumped by power furnished by a 10-hp. motor belted to a horizontal shaft at the top of the machine.

The belt conveyor onto which the materials are dumped travels at 800 ft. per minute and it is driven by the same motor. The cement is dumped into the hoppers on the side opposite the elevators.

The mixer used with the machine is of 14 cu.ft. capacity, and it is allowed to run from 50 to 60 seconds per batch. The whole cycle of loading, raising and discharging of the bins and returning them to the starting point can be accomplished in 2 minutes, and 268 batches have been mixed in a working day. Normally the bins rise to elevating position in 17 seconds. They are elevated, dumped and returned in 33 seconds, a total of 50 seconds. The dumping alone occupies 25 seconds. This allows at least a full minute for loading, which is liberal for the average man and allows him a good rest period. With this machine, as high as 546 ft. of track has been concreted in a working day.

Referring to the specifications listed earlier, it is evident that uniformity in mix is secured by the provision of uniform bins or pockets in the elevator, each of which is of 3 cu.ft. capacity. On the second point, but four men are used in filling the bins, one to each of four. The time required has varied from 12 seconds to 1 minute. Finally, the labor saving which this machine has effected is remarkable in that four men can lift as much gravel through the short distance necessary as eight men can lift the distance of 40 in. formerly required. The pictures tell the rest of the story.

Another device which promises important savings is a multiple-tup concrete breaker, applying the "skull-cracker" principle on a larger scale. It will have five pointed hammers, three between rails and one outside on each side, with apparatus for raising them slowly and tripping them at the top of their travel, the whole machine meanwhile being moved forward at any predetermined rate.

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*See issues of this paper for July 10, 1915, page 73; Feb. 24, March 17 and April 21, 1917, pages 336, 508 and 747, respectively; Sept. 8, 1917, page 403, and Nov. 30, 1918, page 969.

TRUCK CRANE A GREAT ECONOMIZER

A device which is jointly used by the overhead and track departments at present is the "International" truck crane, made by the International Crane Company. Its appearance is indicated in several of the accompanying illustrations, where it is shown doing line department work.

This device consists of a rotatable derrick, mounted on a 7½-ton Mack truck. The derrick has a lifting capacity of 6,000 lb. at 12-ft. radius, with corresponding capacities at other radii. The derrick is operated by a Stearns engine.

For loading purposes in the track department a ½-yard Lakewood bucket is added to the derrick, but there are also numerous uses for it in lifting and carrying, as shown. The writer witnessed a job in which a steel trolley pole was lifted with a mass of concrete around its butt and dropped into a hole some yards distant, the whole operation requiring but a few minutes after the machine reached the work. The pole and attached concrete weighed about a ton. Only a foreman and two men are required on the ground and the derrick man and the chauffeur on the truck.

A STRETCH OF NEWLY LAID TRACK IN CLEVELAND
THE TRACK AT THE RIGHT IS TEMPORARY

This crane was originally designed to be self-propelling, and to that end was provided with a driving shaft with sprockets on the end to connect it by chain to the truck axles. The mounting on the Mack truck, however, provides a means of transporting the crane rapidly, as it can now be moved at a speed of 10 m.p.h., more or less. The sprocket shaft, however, will be utilized on the crane with its Mack truck mounting by putting on one or two "niggerheads" in place of the sprockets. This will still further extend the field of usefulness of the outfit.

No outriggers have been found necessary on the truck because by a simple clamping device the elliptical springs are clamped solid and the fulcrum or point of reaction is transferred to the outside rear wheel treads. As the outside gage of these wheels, which are double, is very wide this furnishes a reactive moment ample to resist overturning at the rated load.

In connection with its construction work the way department of the Cleveland Railway employs a Thew electric shovel, illustrated in action preparing the way for a stretch of new track now being installed. The picture also shows the concrete trolley poles, which are used very largely in the city, in place ready for plumbing.

While investigating the present track work in Cleveland the writer "snapped" a couple of views of some finished track and a job concreted in paving between rails and ready for connection with the city paving. The temporary track is still in place in the latter picture. The other is doubly interesting because it shows T-rail track and grooved girder-rail track side by side. At a little distance the two cannot be distinguished.

Dismantle to Escape Paving

THE North Coast Power Company has at Vancouver, Wash., about 8 miles of track within the city limits and about 7 miles outside the city. The franchise requires that when the street is improved, the company shall prepare the foundation for the paving and pave within the rails and for a foot outside of the rails. Recently the city council decided upon the improvement of a portion of Columbia Street on which the company has tracks for a distance of approximately 2,600 ft. The cost of preparing the foundation for this section would have been approximately $10,000. Since the company earns less than 1 per cent on its investment, after deducting operating expenses, taxes and 3½ per cent depreciation, it was not in a position to raise the money for this foundation and paving.

ONE OF THESE TRACKS IS T-RAIL, THE OTHER GROOVED GIRDER. WHICH IS WHICH?

As the company has approximately 13,000 ft. of track in Vancouver that is in streets not paved, and as some of these streets may be paved later, the company has requested the city council to amend its franchise to the effect that when paving is ordered for any streets on which there are tracks the company will not be obliged to prepare the foundation or lay the paving unless it is earning more than 6 per cent on its investment. The council is not inclined to do this, and the company at present sees no alternative other than to remove tracks from Columbia Street and to follow the same course on other streets when paving is ordered for them. The half mile of track in question is not essential to the operation of the passenger service of the company, but it is helpful in its freight business and especially so for industries which have large investments near by.

Record Attendance and Interest at Omaha

Mid-Year Operating Men's Meeting of Iowa Electric Railway Association and Nebraska Railway Men Enlivened by Large Number of Stereopticon Slides Showing Shop Kinks

THE mid-year convention of the Iowa Electric Railway Association, held at Omaha, Neb., Sept. 16 and 17, was unanimously declared to have been an outstanding success by the fifty-four railway men in attendance, representing every electric railway in Iowa and Nebraska except six, and concurred in by the thirty commercial men present. This registration of eighty-four delegates set a new record for the association, and this, together with the business-like manner in which the convention was conducted, and the worth-while papers and discussions, dispelled any doubt that may have existed as to the desirability of continuing the association meetings. The success of the meetings was attributable in large measure to the work done by John Sutherland, master mechanic Tri-City Railway, Davenport, Iowa, as chairman of the committee on program and arrangements, by T. E. Wood, master mechanic, Omaha & Council Bluffs Street Railway, and W. G. Brooks, Westinghouse Electric & Manufacturing Company, who personally took seventy-six pictures in various Iowa railway shops, from which stereopticon slides were made so that the kinks and equipment shown could be more interestingly and intelligently discussed at the convention.

The opening session of the convention on Thursday morning was called to order by President H. E. Weeks, vice-president Tri-City Railway & Light Company, Davenport, who spoke briefly of the change in outlook for the electric railways in Iowa from hopelessness to hopefulness by virtue of the recent decision of the State Supreme Court, which relieved the companies from the authority of the municipalities to enforce the rates of fare specified in the franchises. He thought this would put the railways in a position to go ahead, although it would be necessary to continue strict economy in the operation of the properties in order to hold fares down to a basis that would not drive away traffic. Mr. Weeks then turned the meeting over to John Sutherland and retired, for it had been planned that this mid-year meeting should be exclusively for the operating men, the prevalent feeling being that there would be greater liberty of discussion if the managers were not present.

The remainder of the Thursday morning session was occupied entirely by the reading of the four papers by Messrs. Keith, Anderson, Feist and Kennedy, the opportunity for discussion having been reserved until the Friday morning session. These papers are printed in abstract elsewhere in this issue, except the one by Thomas L. Kennedy, storekeeper Tri-City Railway, on railway shop storekeeping methods, which will appear in a later issue.

On Thursday afternoon the members were taken in a special two-car train of the Omaha & Council Bluffs Street Railway on an inspection trip of the local property. Two of the company's carhouses, the training school for trainmen, the shops and one of the substations were visited. At the trainmen's school George Beetle, instructor, demonstrated the course given the students. Track and overhead were inspected en route, and at the shops arrangements had been made so that the delegates were able to see all of the shop activities in operation, including several new practices recently inaugurated, and which will be covered later. A few of the delegates particularly interested in trackwork accompanied R. H. Findley, superintendent of track and roadway for the local company, in an automobile, for an inspection of some of the new track and track construction facilities, including a new four-track open terminal recently installed to serve the new Ak-Sar-Ben fair grounds at the time of the annual fair, which was under way at the time of the convention.

CAPITALIZING THE RESULTS OF THURSDAY'S MEETING

The Friday morning session had been reserved for the discussion of the papers presented the day before, or any of the practices on the local property, or the pictures which were shown at this time portraying kinks in various Iowa shops. Some of the pictures had been taken without the knowledge of the master mechanic and were shown at this time to force him to his feet to describe the equipment or practice pictured.

In discussing the paper on overhead practices by Mr. Keith, H. Skelly, Davenport, asked about the experience had in the painting of iron poles, particularly as to whether better results could be obtained by letting this work out on contract or by having it done by the company's own men. He was of the opinion that it was better to let this work out because it relieved the company of all responsibility in case a pedestrian came in contact with the fresh paint. Others expressed the opinion, however, that it was much better for the company to do this work itself, as it could control its men and be as sure of a better job.

The question of the use of ¼-in. galvanized strand wire versus No. 6 solid wire for cross spans was brought up and Mr. Keith said that the solid wire was strong enough, but that he did not like to use it because it always looked as if it was kinked after it was up. One of the delegates said he had had a great deal of trouble with wood strain insulators pulling apart, and that he had therefore abandoned them for porcelains. Mr. Keith replied that he had had very good success with wood strain insulators and did not think he had lost a single one in Des Moines in seven years.

W. O. Jacobi, superintendent of electric lines, Omaha, referred to the practice of his company of butt-treating all poles and using poles having a large circumference at the ground line. A protecting sleeve is shrunk on all the steel poles and they are set in concrete, as Mr. Keith recommended in his paper. Mr. Jacobi said that he thought a saving could be made by using No. 4 E. B. B. galvanized iron wire in place of the $\frac{5}{16}$-in. stranded wire recommended by Mr. Keith, for he contended that it takes less time to make up the ends with this kind of wire in the cross spans. He said also that there is less chance of moisture remaining on and in the wire and causing corrosion. Furthermore, it is possible to determine more accurately the remaining strength of a solid wire than of a stranded wire, after it has begun to rust. In regard to sleeve splices, Mr. Jacobi said that his company was making its own out of ¾-in. round brass rods, 15 in. long, by drilling a hole, tapering each end and milling a slot near the center to meet the drill hole. These splices are installed without solder.

He compared a spring trolley switch which the Omaha company is making and using with that described by Mr. Keith. It consists simply of a No. 14 steel spring tongue, 1 in. wide, which is fastened to the frog by means of two bolts, for which two holes must be drilled in the frog. This steel spring tongue is bolted through the groove in Westinghouse trolley frogs.

The location of trolley frogs properly to serve all kinds of cars, including construction cars with the trolley stand over the front trucks, Birney safety cars with the trolley stand in the center of the car and the double-truck cars with the trolley stand over the rear trucks, was spoken of by Mr. Jacobi, who said that the only way this could be done was to "cut and try," finally placing the frog to favor the most common type of car using that route.

SUPPORTING TROLLEY SPAN WIRE FROM BUILDINGS

In discussing the recommendation of Mr. Keith to co-operate with owners of new buildings in order to place eyebolts in the building walls for supporting the span wires, and thus to remove the trolley poles from the street, it was found that a number of companies followed this practice. In Davenport, Mr. Skelly said that this was done on every new building erected along the car lines, use being made of bronze bolts, to avoid the rust streak on the wall which comes from the use of an iron eyebolt. He said that the number of poles used was being gradually reduced in this manner, thus cleaning up the street and saving the poles and relieving the company of the maintenance expense of the poles. In installing an eyebolt, the building owner is induced to sign a contract which stipulates that if at any time he wants the eyebolt removed, he must agree to give the company the right to set a pole, thus protecting the company against losing its pole rights in going to the eyebolt. He said that the simpler such a contract was the better, for there was always a good deal of hesitation in signing a contract in this connection.

Mr. Keith pointed out that in Des Moines the company gets a release from the owner of the building on which an eyebolt is installed against any damage which may result from the presence of the eyebolt. The practice of installing eyebolts whenever possible was also followed in Omaha.

DISCUSSION ON STOREKEEPING AND ON TRANSPORTATION

Mr. Kennedy's paper on storekeeping methods evoked lively discussion, a digest of which will be given in a later issue with an abstract of the paper.

In the discussion of Mr. Anderson's paper on transportation the author was asked about the frequency with which he made changes in the schedule of trippers. He explained that the change was not made more often than once in fifteen days and that he personally made the observations which determined these changes. In answer to another question he explained that in Davenport the conductors ring up both passes and cash fares and tickets on the cash side of the register, observing that this does not make possible a very good check on the conductors. It was explained that in Des Moines, where the city fare is 6 cents, and where 4 cents additional is collected beyond the city limits, both the 6-cent and 4-cent fares are rung up on the cash side of the register, involving a difficulty similar to that encountered in Davenport.

The remainder of the discussion, which continued through Friday morning and part of the afternoon, was inspired by the showing of a number of slides of kinks in various Iowa railway shops. Some of these kinks have already been pictured and described in ELECTRIC RAILWAY JOURNAL, but the majority of them will be published in a later issue, the delay permitting a better handling in the paper and an assurance of better halftone cuts than could be secured if they were rushed through.

A LITTLE FUN IS INTERJECTED

The meetings of the association were held in the Masonic Temple and luncheon was served both days in a room adjoining the meeting room. On Thursday evening the members were treated to a banquet followed by a minstrel show put on by employees of the Omaha & Council Bluffs Street Railway. While the show was reported to have been entirely prepared in three days, it was thoroughly enjoyed by the delegates. After that, a troupe of professional entertainers provided an hour's amusement. Between the minstrel show and the vaudeville hit of the professionals, the film known as "The King of the Rails," the safety-car film and a short piece of film showing how the claim agent of the Tri-City Railway won a $20,000 injury suit were shown. The last named was the case of a former employee who, while under age, had received a slight injury. By the time he became of age, a number of years later, he claimed his right arm had become disabled. It was learned that he had taken a building contract and was actively engaged in doing the work himself. A motion-picture operator, on the pretense of showing building construction work, pictured this man doing the work himself, wherein any doubt as to the soundness of the man's right arm was completely dispelled.

N. S. C. Manager Reports

IN HIS report to the National Safety Council, General Manager C. W. Price summarizes the year's accomplishments as follows: (1) The *National Safety News* was developed from a one-page letter to a twenty-page magazine. (2) Local councils with permanent organization and paid staff were increased from seven to sixteen. (3) Great strides were made in public safety through the development of vigilance committees, chauffeurs' schools, local safety drives and safety education in public schools. (4) The engineering section was organized and assigned the development of important national codes. (5) Safety education, as suggested by the council, received greater attention from technical schools and colleges than ever before. (6) The contents of the council's library and bureau of information were enriched and the number of inquiries answered increased. (7) The service to members was enlarged by the addition of bulletins for the meat factories and rubber sections and by the issuance of sectional safe practices pamphlets. (8) The membership was increased to 4,051, a net gain of 290.

How to Construct and Maintain the Overhead*

Some Practices Proved by Experience Are Pointed Out—Locating Curves and Frogs, Methods of Repair and Special Material Designs Discussed

By KIRK J. KEITH
Superintendent of Overhead Des Moines (Iowa) City Railway

A PRIMARY consideration in overhead work is the purchase and standardization of only the best of materials. The wood poles should be butt-treated to a point 1 ft. above the ground line. Tubular steel poles should always have the protecting sleeve (or dog collar) shrunk on the lower section of the pole at the ground line. Tubular, Bates or any other steel poles should be set in concrete 6 ft. in the ground with a rake of 6 to 8 in. A very good mixture is 1:3:5 of wet concrete. Always be sure that the pole is painted and free from rust before it is set. Wood poles should be set 6 ft. in the ground and well tamped, with a rake of not more than 10 in. Where poles are to be used for span construction they should have a good heel at the bottom and a good breast a little below the ground.

All poles should be set as nearly 100 ft. apart as possible and on property lines. At street intersections, where there is special work to be installed, it would be best to have the four corner poles set on the property lines. Of course this is not always possible. For example, there is a condition in Des Moines where the water hydrant is set on the property line with a catch basin 2 to 5 ft. from the hydrant, or *vice versa,* and an ordinance forbidding us to set a pole within 12 ft. of the hydrant. It can be readily seen that this makes it difficult for us to maintain our special work properly.

Often in city work, especially where a new building is being erected and the cellarway is excavated even beyond the sidewalk line, it is good practice to set at the point where the pole should be set an iron pipe a size larger than the outside diameter of the pole at the ground line, and to let the contractor build his wall around the pipe. This should be long enough to extend 1 ft. below the floor line. If the pipe is longer than 2 ft. it should be filled up to a point 6 ft. below the sidewalk line. After the wall is thoroughly set, the pole is set in the pipe and the space between the pipe and the pole filled with a rich mixture of grouting, an iron wedge being used between the top of the pipe and the pole to give the pole the proper rake and insure against crushing of the grouting.

A span-wire clamp, with a wood or porcelain strain in which to fasten the span wire, should be used on steel poles. There should usually be two insulators between the point of contact and the pole, but some cities have ordinances specifying more than two. The span wire should be either $\frac{5}{16}$-in. double galvanized strand or stranded copper-clad wire, and it should be pulled tight.

INSTALLING TROLLEY WIRE ON CURVES

Curves should be made up with straight-line clinch ears for round wire and on phono-electric wire it is better to solder the ears to hold them in place. With a trolley wire 19 ft. above the rails curves should be offset toward the inside of the center line of the track, 3½ in. to each inch of the super-elevation of the outer rail, and held in place with single-body pull-offs if for one track and double-body pull-offs on the outside track and single pull-offs on the inside track if for double track. The number of pull-offs must, of course, be determined by the radius of the curve and the spacing of poles. The following table represents practice in this line:

Radius of Curve, Feet	Spacing of Pull-Offs, Feet	No. of Pulls Between Supports	Distance Apart of Poles, Feet
40	7	4	35
50	8	4	40
60	9	4	45
70	10	4	50
80	11	4	55
90	12	4	60
100	13	4	65
125	14	4	70
150	15	4	75
200 500	20	3	80
750	25	3	100

The locations of the trolley wire on curves given above will not hold true on city construction, as consideration must be given the elevation of the outer rail, the height of the trolley wire above the rail, the track gage, the radius of curvature, the distance from the center of the car to the pivot of the trolley base, the distance from the center of the car to the center of the truck, the horizontal distance from the pivot of the trolley base to the point of contact between trolley wheel and trolley wire. The offset of the trolley wire would be:

$$S = \frac{EH}{G} + R - \sqrt{R^2 + P^2 - Q^2 - L^2}$$

in which all values are in feet and:

S = radial offset of trolley wire toward center of curve.
E = super-elevation of outer rail.
H = height of trolley wire above rail.
G = track gage.
R = radius of curve.
P = distance from center of car to pivot of trolley base.
Q = distance from center of car to center of truck.
L = horizontal distance from pivot of trolley base to point of contact between trolley wheel and wire.

The trolley frog should be attached to the trolley wire at a point over, and as near as possible to, the track switch point, so that the trolley wheel will take either the main or branch line according to the route of the car. The closer the frog is set to the switch point, the less the danger of the trolley wire wearing out as it approaches the frog. On a 42-ft. 6-in. radius curve, my practice is to set the frog level, directly over the center of the heel of the track switch; on a 45-ft. radius curve, to place it about 6 in. ahead of the heel of the switch point, and on a 50-ft. radius curve, to place it 9 to 12 in. ahead of the heel of the switch and toward the switch point. As these distances may not hold in all cases, it is a good idea in installing the frog to clamp it on the wire only so tightly that it will not move, directly over the heel of the track switch; to let a couple of cars go through the switch, and to watch the trolley wheel to see which way the frog should be moved. Only one or two operations will be required before the frog can be set in a permanent position. It will be found invariably to be toward the point of the switch. Of course in most cases a frog set above a point where the distance between the outer rail of the branch track and the nearest rail on the main line is 1 ft., the trolley wheel will follow the proper wire, but it has a very heavy wearing effect on the wire approaching the frog, which makes frequent replacement necessary.

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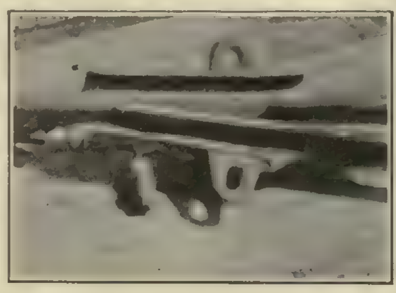
*Abstract of paper read at convention of Iowa Electric Railway Association, Omaha, Neb., Sept. 16-17, 1920.

Trolley wire should be guyed at each end of all curves and every half mile on tangent track. Care should be taken to see that strain guys have equal pulls and that the strain plate is not twisted out of line. Where possible the strain of these guys should be taken by anchor guys in line with the pull; if this is not possible, a head guy should be used to the next pole. Where the strain is not too great, the anchor should be of a mechanical type, but if there is to be a very heavy strain, the old deadman type is preferable. No two feeder lines should be tied together without the use of an automatic sectionalizing switch, except in cases where there are two or more lines which feed the same trolley section. The days of heavy feeder lines have been practically eliminated by the advent of the automatic substation. In Des Moines, where we operate 90.43 miles of line, measured on a single-track basis, we have only 460,000 lb. of copper in the system. I mention this fact to show that some of our troubles are gone forever.


SPRING TROLLEY FROG DESIGNED AND USED IN DES MOINES, IOWA

If the Keystone, or any of the other type of steel pole tops is used a very good double insulator arm may be made by using a steel plate ½ in. thick and 3 in. wide, the length being determined by the diameter of the top petticoat of the insulator. The plate is drilled with three 13/16-in. holes, one in the center and one at each end of the plate, using a Keystone truss pin at each end. The plate is bolted to the pole top at the center. On a 22,000-volt line, using Ohio Brass insulator No. 11,622, Keystone truss pin No. 44,109, the distance between the two end poles would be 12½ in.

TROLLEY BREAKS MEAN DELAYED SCHEDULES

We all know what trolley breaks mean to our operating department, so it is up to the line department to keep them at a minimum. In Des Moines the trolley wire in the business district is inspected every week and bad pieces of wire are replaced at once. We used to believe that we could not replace a curve in the daytime or when the cars were running, but would wait until night and then pay time and a half for the work. That was a mistake; we do not hesitate now to rebuild almost any special work in the daytime, and we do it at less than one-third the cost. Quite often it is done without the operating department knowing anything about it. We have some special work where the vehicular travel is so great that it is almost impossible to get on the street. Here, of course, the work must be done at night.

A SPRING FROG DESIGNED AT DES MOINES

To overcome trouble with the trolley frog at wyes, we have designed a trolley frog spring switch which has worked out well. The spring switch can be used with almost any type of frog. The switch tongue is made of hardened steel, ⅞ in. x 5/16 in. x 6 in., the point being slightly flattened and brought to a biased point. A plunger post is inserted 1 in. from the point on the top of the tongue. At the larger end, or heel, a pivot post ⅜ in. in diameter is inserted. Two inches of the curve lead on the frog is cut off and a hole is drilled in the top of the frog for the pivot post, and a slot is cut 5/16 in. in width on top and on the curve side of the frog. A piece of ⅜-in. gas pipe 3 in. long, with the bottom half cut off (about 1½ in.) is then welded to the frog directly above the 5/16-in. slot. Then the tongue is inserted in place and the pivot post riveted on the top of the frog, leaving it loose enough so that the tongue will work easily. A small coil spring, 2 in. long, with a plunger 1½ in. long, is placed in the gas pipe with the plunger up tight against the plunger post. The spring is pushed into the gas pipe, a cap is placed over the end of the pipe and the switch is ready to be installed. A photograph of this spring frog is reproduced herewith.

Lightning arresters are inspected four times a year, and defective ones are replaced with new or repaired arresters. The arresters at all of the substation entrances are inspected after every storm. We inspect our feeder lines four times a year and trim trees as needed. If the tree insulators have slipped out of place they are replaced. It is much easier to do this than to have the line broken down; besides, it is quite a saving in loss of current.

Most of our high-tension troubles are insulator troubles and caused mostly by lightning or the insulator being "shot." We inspect our insulators four times a year, using a field glass most of the time. If any cracked ones are found, they are replaced as soon as the current can be taken off the line. We have an arrangement with the consumers so that the current is taken off the line on Sunday mornings between the hours of 2 and 6. This generally gives us enough time to do our work.

Bulletin No. 3 on "More Transportation"

IN ITS series of bulletins on "More Transportation" the Association of Railway Executives is urging in Bulletin No. 3 the reduction of bad order cars to a maximum of 4 per cent of the total owned. The bulletin cites records showing that when Federal control began about 5.7 per cent of the cars were reported in bad order and at the end of Federal control 6.7 per cent were in bad order. The bulletin states that "the cure of this situation is one of the first and most important problems confronting us," and further on "that the conditions demand that all roads exhaust every possible effort in this direction.

It is by exerting efforts in such directions as this that transportation companies can maintain satisfactory service for the public.

Shop Kinks from Sioux City, Iowa*

A Number of Original Designs of Car and Shop Equipment Are Described and Maintenance Practices as Used by the Sioux City Service Company Are Outlined

BY C. M. FEIST
Master Mechanic Sioux City (Iowa) Service Company

IT HAS been the custom of our company for a number of years past thoroughly to repair, clean, retouch and revarnish the car bodies once every year. However, since so many automobiles and trucks operated by thoughtless drivers have come into common use, with resultant scratching and damaging of car bodies, and also because of the greatly increased cost of labor and material, we have adopted a new system of overhauling.

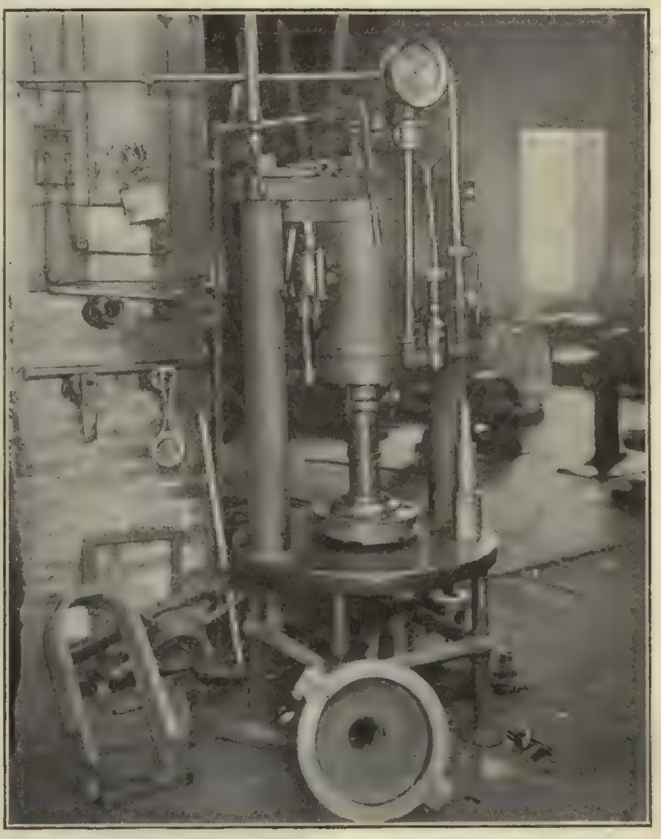
When a car body is newly built in our own shops we still follow the flexible system of painting such as the usual lead, color and varnish coats in order to preserve the wood and steel. Such jobs look well, barring injuries, from twelve to eighteen months, but if such a system of repainting and varnishing should be followed it would usually require one or two coats of color and two coats of varnish, which would delay getting a car body through the shop several days, depending on drying conditions between coats. We find, however, that in this age the general public gives no thought to fine finishes on a street car body. If the body looks fresh outside and is clean and comfortable on the inside, and the car can make the run to its destination without interruption, the average passenger is satisfied.

Our present system of general overhauling of car bodies is to run them through the shop about once every two years, at which time we make all necessary repairs, thoroughly clean the inside finish, including the seats, shades and floors, and wash the outside of the body and the trucks. After all parts are cleaned we apply two coats of railway enamel which has a wonderful covering quality. We stripe, letter and number on top of the second coat of enamel and apply one coat of paint on the roof, floors, trucks, etc. The window sills or arm rests, etc., are refinished if necessary. The car seat rattan is usually varnished and other parts painted.

This system of overhauling has given us very good results and has proved to be much cheaper, taking much less time, and every one in connection with our system seems to be well pleased, as such a job looks good for about two years.

MAINTENANCE OF ELECTRICAL EQUIPMENT

It has been our practice to follow the mileage basis for the care of equipment only in a small degree, and we recommend that inspections be made as often as possible in order to detect minor troubles which can be repaired at an early period at a small cost. This can only be accomplished by close, constant attention. The car operators, when turning in their cars at the close of the day's run, are requested to fill in a daily report blank, which is addressed to the master mechanic, stating the condition of the car they have been operating. These reports are collected and looked over by the night foreman at the barns. If repairs indicated on this report are of a light nature the work is done by the night crew at the barns and the report marked O.K. Should the operators' reports show work to be done beyond the ability of the night force the car is held for the general repair shop.



HOME-MADE PRESS USED FOR BROACHING AND PRESSING IN BEARINGS. HOUSING JIG AND REAMER ALSO SHOWN

Upon arrival of the cars from their respective runs they are first run over the pits before storing them away, where men inspect brakes, trucks, motors and air equipment to the best of their knowledge, make such repairs as they can and report their findings on a special blank. These reports are collected every morning and brought to the general repair shop for the pit foreman's and master mechanic's attention. After they have been looked over they are filed away and kept for two years for legal reasons.

The pit foreman keeps a complete record of the equipment on all cars. From this record he plans to have enough regular cars held for the shop in addition to those being held over from the barns each morning so as to keep his force busy every day. By this method all the equipment is being cared for in the main shop about once a month. One pit crew of two or three experienced men is set aside for general overhauling. This work is in force at all times. A car is brought over the pit and held until the entire equipment has been thoroughly inspected and overhauled. Street railway owners and operators may thank the railway equipment manufacturers for the splendid improvements which have been made in equipment within the last few years. It is now possible, with the aid of intelligent care, satisfactorily to operate and keep in motion a railway system at a nominal expense.

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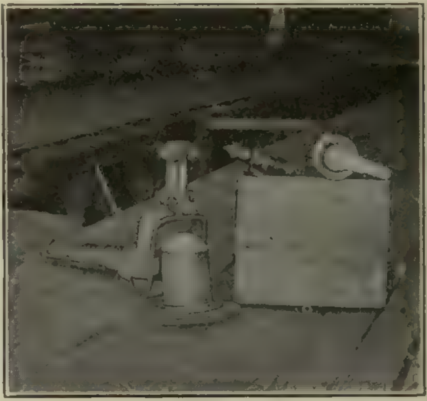
*Abstract of paper presented at Omaha meeting of the Iowa Electric Railway Association, Sept. 16, 1920.

When motors are in good operating condition they should perform their duty for a long time unless damaged in accidents. Should any trouble arise which an expert repair man cannot locate on the surface it might be well to test the fields for short circuits. With one or more partly short-circuited field coils motors will still operate after a fashion, but such field troubles and incorrect commutation will usually in time cause severe flashovers and burnouts.

There are many other troubles which may develop in motors but they are more readily located by the average repair man. In this connection it is essential to maintain reasonably well fitted bearings on the axle as well as on the armature shaft in order to retain the intended alignment for gear, pinion and brush location.

SPECIAL BRAKE HEAD AND SHOE USED IN SIOUX CITY, IOWA

THE REVERSE FLANGE GAGE TEMPLATE IN USE IN THE SHOP



TROLLEY STAND, HARP AND WHEEL BEARING SAID TO GIVE LONG LIFE

The question of reclaiming bearings on old motors having badly worn armature bearing shells and housings came up in our shops. We decided to press a steel seamless tube over the bearings, cutting out the opening in accordance with the original shape for admission of waste packing and cutting new keyway. The thickness of tube selected was such as not to injure the housings when rebored and reamed to a new standard size. For this purpose a special lathe jig and reamer were made up in our own shop. This special job of refitting all armature bearings and housings in a certain type of motor was done during a time when the motors were being overhauled and required no extra work any more than to carry on hand an extra set of bearings and fitting up the housing for the next armature taken out of a motor.

THE TEMPLATE IN USE ON THE TRACK

We believe that a high grade tin base metal should be used in rebabbitting bearings, even at a higher cost. We also recommend broaching the bearings after they are bored in order to produce a tense bearing, which will result in a much longer life. For this particular work a small vertical hydraulic press was designed and built in our own shop.

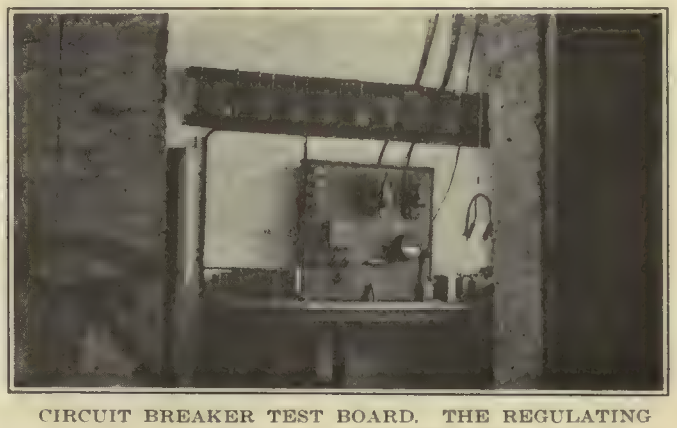
PIT JACKS FACILITATE MOTOR AND TRUCK OVERHAUL

For the purpose of removing and replacing armatures and car wheels convenient pit jacks were built capable of handling 4,000 lb. These jacks operate on a track in the pits and are movable sideways in order to allow them to be placed under axle or armature for best balance. The jack cylinders are made up of 8-in. extra heavy pipe with suitable pistons traveling the extreme distance up and down required for the above-mentioned work. City water pressure is used to operate the jack, and occasionally for extreme lifts air pressure is added. The water from the piston is discharged into a tank so that it is not wasted, and this is forced back into the cylinder by means of the shop air pressure, for re-use.

Circuit breakers are thoroughly inspected about once a year and overhauled if this is found necessary. They are then reset to the desired amperage. This resetting can be done with the circuit breaker still on the car as well as on the test bench. In the pit foreman's workshop department we have installed a switchboard for this purpose. There are sufficient grids bolted to the wall and connected to a controller in several steps so that the current flow may be varied from 50 to 400 amp. The heavy test current is broken by tripping the circuit breaker, which also serves to protect the other shop circuits from interruption if too heavy a current is pulled at the test board, the controller in the circuit being used only to regulate but not cut off the current.

There is a great deal to be said with reference to the correct wheel gage. This can be best proved by fastening two short sections of good rail onto a board exactly 4 ft. 8½ in. apart and turning this device upside

COMBINATION HYDRAULIC AND AIR PIT JACK IN SIOUX CITY



CIRCUIT BREAKER TEST BOARD. THE REGULATING CONTROLLER DOES NOT SHOW

down on the set of wheels just pressed on an axle. Note the round throat of the wheel contour in relation to the round edge of the rail. If the wheels are pressed correctly there will result a free rolling set of wheels with the best possible traction. This would prove that the correct wheel gage should be 4 ft. 8½ in.

A special wheel gaging template has been made up in our shops for testing purposes. This template has a reverse flange shape which can be laid on the track in frogs, crossings or curves to show the exact action of a wheel passing through. It has decided many debates between the track and repair shop departments when no one, as usual, wished to take the blame for car derailments.

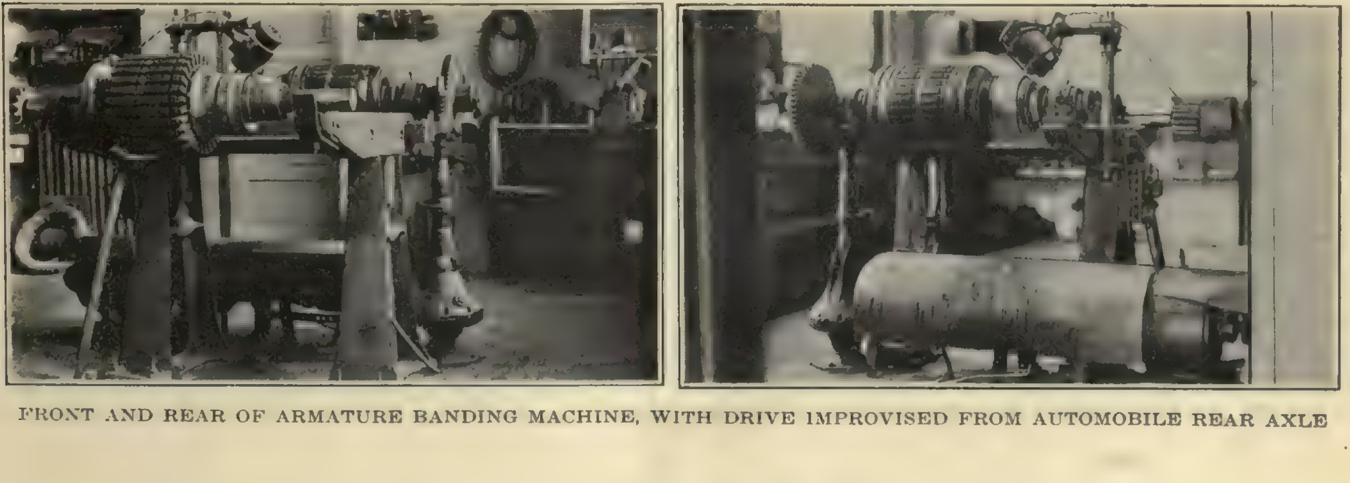
Worn pedestal jaws and journal boxes are very detrimental to the free running of a truck, as such a condition allows car wheels to run out of square. This adds a friction load, causes undue wear on wheels and rails and knocking when the truck enters crossings and frogs. We found it necessary to rebuild pedestals with a special gib plate to a new standard on our older trucks. In order to do this work correctly, the journal boxes are planed down on the sides. The manufacturer was requested to change the pattern of the boxes to conform with the new standard measurements, at the same time retaining a strong thickness in the walls of the new journal boxes in order to strengthen them and to give room for the special gibs.

As the standard shapes of brake shoes and heads usually recommended are inefficient and costly to maintain, I would suggest that a change be made in shapes and materials used, particularly in the heads. The standard shoe head carries plenty of metal in general, but is very small at the ends. Shoes soon become worn at one end and this allows them to climb up the wheels, causing the cars to jerk while stopping. The rapid wear at this end soon calls for renewal at a considerable expense.

Several years ago we made up complete brake shoe and brake head patterns. The brake head patterns were made to fit the brake beams in their former shape, but the face of this head was entirely changed to receive a new type brake shoe back. As a result we have at this time practically only one type of brake shoe. It fits the various heads and shoes can be replaced in about half the time required for the old style. These head castings are made of gray iron and weigh from 12 to 14 lb. each. The heads have two sockets instead of one for fastening the shoes. The latter are installed by slipping them in the heads all around, then setting the brakes, and while the pressure is on inserting the pins which lock the shoes in place. The heads cost us 4 cents a pound and resist the wear better than malleable castings.

We build a trolley base in our shops that is designed in line with the usual roller-bearing type but with an improvement. The turret castings are so designed as to carry oil, one filling lasting about two years. With this method of construction the central wearing post or bearing is entirely surrounded by and is floating in a perfect film of oil. The base thus functions freely and quickly in adapting its position to changes in the overhead position. In many bases, one oils them at the top and the oil eventually works through to the bottom and onto the car roof, leaving the bearing dry.

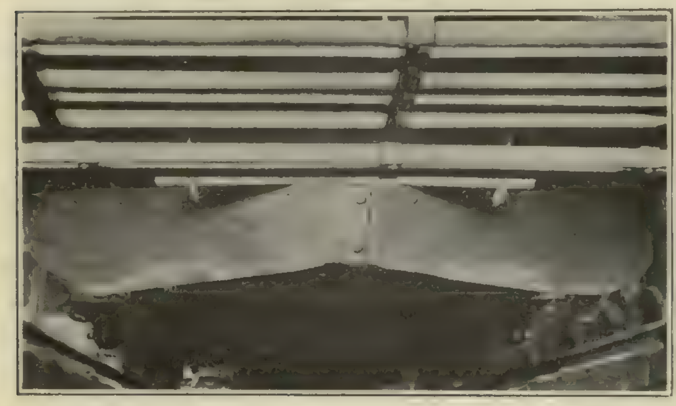
I have personally spent some money in the production of an efficient trolley harp, trolley wheel and its bearing. The object of the design was to provide sufficient bearing area and have a constantly dry conductive lubricant which would carry the current with the least



FRONT AND REAR OF ARMATURE BANDING MACHINE, WITH DRIVE IMPROVISED FROM AUTOMOBILE REAR AXLE resistance and thus insure long uninterrupted life and freedom in action. The harp carries a fiber washer on either side which insulates the wheel from the harp at the shoulders. These washers are thick enough so that they will outwear the wheel. The wheel bearing is 1⅝ in. long and contains enough oil to last the life of the wheel, so that it never needs to be lubricated except when newly installed.

SNOW-FIGHTING OPERATIONS

In climates where snow frequently interferes with the street car service snow-fighting equipment must be constructed to stand the strain of abuse and should be kept ready to be put in action whenever needed without constantly breaking down or wearing out. During the last twenty-five years several types of under-platform brooms and plows have been bought or built in our shops. None of these proved to be a great success. We next decided to try out a V-shaped tank-steel plow, having its nose suspended from or hinged to the car floor and depending upon its own weight to hold it down on the rail. This plow is light, inexpensive, does its work well and is carried on our cars the year round. When these wings are hooked up about 4 in. above the rail they serve as a splendid additional life guard. As this plow extends all the way across the track between rails, it serves also to remove some of the snow there, so that motors do not drag on it.



SNOWPLOW HINGED AT POINT, ITS OWN WEIGHT HOLDING THE WINGS DOWN ON THE RAIL

Our sweeper equipment consists of one rattan broom sweeper and four steel constructed combination sweepers and plows of an entirely new design. These machines are double-ended and have very efficient side wings for the purpose of pushing the snow that has been swept off the track a distance of about 7 ft. away from the outside rail. The revolving brooms on these machines are driven at a speed of about 300 r.p.m. by a separate street railway motor located on the platform just back of the broom and covered with a box. The broom speed is controlled by means of resistance and also by adjustable counter chain shaft sprockets. The side wings on these machines are of great advantage to our system, as other traffic on the streets constantly plows the snow back onto the rails. It is a common occurrence to see one or more of these big machines busy during the winter months, using the side wings to plow the snow back from the rail. This work is done without hindering the regular schedule cars in service. Owing to the design of these side wings they can be operated at the usual car speed. These machines were designed and built in our own shops and found to give much better service and to go through heavy snow when the regular rattan sweepers failed.

In connection with the usual tools and machinery in the armature room, an armature banding machine has been made up by using one end of an automobile rear axle as the drive with direct connection to a variable speed motor. The motor is direct connected to the automobile drive shaft and the axle drives the armature through a worm and gear. This device was inexpensive and it furnishes various speeds and plenty of power. Two coil clamping devices have been developed to force coils gently inward before banding.

Economies in the Transportation Department*

Turn-Back of Trippers and Frequent Revision of Schedule to Conform to Traffic Changes Recommended

BY EDGAR I. ANDERSON
Superintendent of Transportation Tri-City Railway & Light Company, Davenport, Iowa

IF A CAREFUL study of street railway conditions as they exist today were made, it would probably disclose the fact that there is hardly a road but what has lines on which business has fallen off at some hour of the day, so that the present schedule provides more service than is justified. This is more noticeable at night, as automobile owners use their machines most for their transportation needs combined with pleasure at this time of day, and these are the people who formerly patronized the street cars in the evening. For this reason schedules that have been in effect for years should be checked, as the cars may be carrying lighter loads than in the past and many of them can be pulled off on their last trips without complaint from the public.

Then, again, many times cars are operated at the request of patrons in a certain locality, but later these people move or purchase automobiles, and the traffic for which the service was provided no longer exists. Too often we do things because it has been done before, and many unnecessary cars are operated today because they were needed years ago.

TURN-BACKS, JUDICIOUSLY SCHEDULED, YIELD SAVINGS

Many times a system of turn-back of cars can be adopted to accomplish a substantial saving without serious detriment to the service. Every extra car should be operated only as far out as necessary on a line and then brought back to the traffic center promptly for another load. Some cars can be turned back sooner than others on the same line. To accomplish this the schedule maker should make personal inspections of traffic often, as conductors' trip reports do not show where passengers board and leave cars. When two or more lines use the same track extra cars can often be placed so as to relieve two lines.

In operating extra cars on two or more lines and turning them back at different points each trip the crew should have written orders, as these are generally too complicated for a train crew to remember. Without written orders the crew may go wrong or lose time on the road getting instructions from a supervisor.

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*Abstract of paper presented at Omaha meeting of Iowa Electric Railway Association, Sept. 16, 1920.

During the war the Tri-City Railway operated on the Davenport division forty-three regular cars and was required to run forty-five extra cars morning and night to the Rock Island Arsenal. This did not include the regular tripper service on other lines. These cars to the Arsenal were run from every line in the city, each car running only as far out on a line as it was necessary to secure a load, so that no extra mileage was run. To operate such a large percentage of extra cars and eliminate all overtime was no easy problem. Nearly all of the extra cars were operated in regular runs, but as more cars were added the runs had to be revised every fifteen days. It was necessary to keep these cars in regular runs to avoid overtime. There was no dead time in any of these schedules.

"KEEP THE CARS ROLLING" IS A GOOD SLOGAN

In making schedules for regular cars, lay-overs and dead time should be eliminated, as the wages of platform men today are such that there is no company that can afford any idle car-hours. Where delays are to be encountered, such as those at steam road crossings or in heavy vehicle traffic, too much slack time should not be allowed.

The Tri-City Railway operates forty-two regular and twenty extra cars daily on the Davenport division and pays no overtime except in case of wrecks or trolley breaks. It has no dead time or lay-overs in any schedule, under a nine-hour contract with the trainmen.

Schedules and time cards should be as self-explanatory to the trainmen as possible. The color scheme for timetables is a good idea, black for week-days, blue for Saturday and red for Sunday. A glance at a colored schedule or run will show the trainman whether he has the right one for that day of the week. As much information should be given as possible, such as direction of starting, miles in the run, time of starting, time run is completed, hours in run, and time extra cars are met on switch. This will save time on the road.

All bulletins and time cards at station and barns should be kept up to date. If old bulletins are allowed to accumulate on the bulletin board men will lose interest and will not consult the board daily. The Tri-City Railway bulletin boards hang from the wall and fold like the pages of a book, both sides of a board carrying bulletins and being covered with glass. The glass keeps them clean and no old bulletins are allowed to remain on the boards.

Recently the Tri-City Railway adopted a new form for car reports. This new form has meter readings on one side and car reports on the other. Every "run" has the mileage posted and each trainman has a book showing the miles between all cross-overs and junctions so that he can make a record of his mileage by full trips or for a turn-back. These reports are looked over by the night barn foreman for car defects and sorted in trays according to lines. The correct mileage for each run is then obtained by adding the mileage on the cards in that tray. Each card is then checked by the operating department to see that all turn-backs have been deducted from the mileage. After corrections are made, the cards are sent to the meter clerk, who makes up the monthly report of power consumption for each motorman, also the car-miles for the line and the total car-miles. The mileage is then sent to the store-room where the records are kept of wheel, gear, pinion and lubricant mileage.

This is the only mileage record that is kept, and as each report is checked it gives each department a correct mileage. It was quite a task to instruct the motormen so that these reports would be correct, but after thirty days there was only one incorrect report in three hundred coming in.

This simplifies the old system of having separate car reports and meter slips and of making out the car-miles at the barns to be sent to each department. Formerly the meter reports were not checked or corrected, and if the monthly report was wrong it gave a motorman a good excuse for his high power consumption.

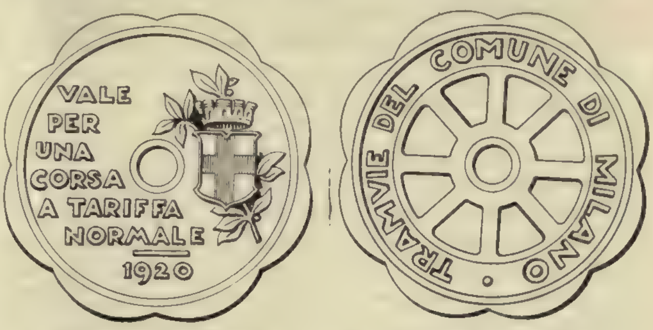
As power is one of the great items that go to make up the expense of operating a road, some device and system that will reduce the power consumption should be adopted, provided it is not too complicated for the trainmen to understand.

New Fare Tokens in Milan

Artistic Design Used for Bronze Tokens—Use of Tokens First Step in Modernizing System

THE accompanying illustration shows the new fare tokens which are now in use, since Aug. 12, on the lines of the Milan (Italy) Municipal Corporation Tramways: The tokens, which are of yellow bronze are coined in two sizes, the full fare about the size of the United States quarter and the half fare about the size of a 5-cent nickel.

The half fare is in force between 6 and 9 a.m. on all cars of the Corporation Tramways and the full fare, which is 30 centesimi, obtains from 9 a.m. till night time. Practically, conductors are allowed to accept two half-fare tokens or one half-fare token and 15 centesimi in coin in payment of one full fare and one full fare token in payment of two half-fare rides.


VALE PER UNA CORSA A TARIFFA NORMALE 1920
TRAMVIE DEL COMUNE DI MILANO

"Good for One Ride at Full Fare" "Tramway of the City of Milan"

FULL FARE TOKENS OF MILAN, ITALY

Indications are that this is but a first step toward the modernization of service, the management having already ordered fifty motor cars and fifty trailers of a larger capacity than the existing rolling stock and which will be equipped with double doorway rear doors and single doorway front doors, for cars of the double-end type, with folding controlled doors and steps. It is the intention of the management, in case the innovation of fare tokens should favorably impress the public, to try out the prepayment operation, following the successful system on the Rome Municipal Corporation's lines.

As can be easily seen, Italy apparently wants to go ahead in following American operating standards, and it is predicted that ere long the "safety car," perhaps even "Made in Italy," under the American patents, may be in operation on a number of the city systems.

American Engineering Council to Meet and Organize

First Meeting of the Operating Body of the Federated American Engineering Societies to Be Held in Washington November 18, 19 and 20—Epoch-Marking Event Will Attract Engineering Representatives from All Parts of the Country—Herbert Hoover to Address Meeting

LESS THAN two months will elapse before the first meeting of American Engineering Council, the representative and operating body of the Federated American Engineering Societies, organized in Washington June 3 and 4. The story of the organizing conference was related in these columns, issue of June 12, page 1213, and commented upon, page 1184. More than 110,000 engineers were represented by 140 delegates from seventy-one organizations. This new organization is the realization of long-held hopes and much-discussed plans to have a representative and all-inclusive body which would speak for all engineers and allied technologists, whenever their combined judgment was desired or useful and whenever they, themselves, desired to be heard.

As stated in the constitution, this organization of engineers is for service to the public welfare. It has been called an engineering organization, which is for engineers and things engineering similar to the Chamber of Commerce of the United States in the business and commercial world. Composed, as it is, of organizations of engineers, local and national, it for the first time provides adequate machinery for local engineering organizations to be heard in national affairs.

Running through all discussions about this new organization is the strain that this is the Age of the Engineer. It has been called by some the Iron Age, or the Age of Machinery, the Age of Electricity and what not, but such terms are now recognized as failing in significance. The engineer has been the one universal agent in this modern civilization or age; he has been the one who has made possible those products and facilities now recognized as necessities and conveniences, those things which mark this age as different in some way from previous ages. This organization is the result of the crystallization of that feeling plus the desire of the local and regional societies to have adequate voice and representation in any nation-wide organization which is intended to reflect or formulate the combined engineering judgment of the country.

First Meeting of American Engineering Council of The Federated American Engineering Societies

Washington, D. C., Nov. 18-20

All Sessions in Small Ballroom, New Willard Hotel

Thursday, Nov. 18, 1920

MORNING SESSION

8:30 A.M. *Registration.*

10 A.M. *Opening Session of American Engineering Council of Federated American Engineering Societies.*

1. *Call to Order by Richard L. Humphrey, Chairman Joint Conference Committee.*
2. *Election of Temporary Chairman.*
3. *Election of Temporary Secretary.*
4. *Appointment of Temporary Committees:*
   - (a) *Program.*
   - (b) *Credentials.*
   - (c) *Constitution and By-Laws.*
   - (d) *Nominations.*
   - (e) *Plan and Scope.*
   - (f) *Budget.*
   - (g) *Resolutions.*

AFTERNOON SESSION

2 P.M. Address, *"Engineering Council," J. Parke Channing, Chairman.*

2:30 P.M. *Discussion of the field of activity for The Federated American Engineering Societies.*

Friday, Nov. 19, 1920

MORNING SESSION

9 A.M. 1. *Report of Committee on Nominations.*

2. *Election of Permanent Officers.*

3. *Report of Committee on Constitution and By-Laws.*

4. *Formal Ratification of Constitution and By-Laws.*

5. *Report of Committee on Plan and Scope.*

AFTERNOON SESSION

2 P.M. 1. *Report of Committee on Budget.*

2. *Report of Committee on Resolutions*

EVENING SESSION

8:30 P.M. 1. *Introductory remarks by the President of American Engineering Council.*

2. *Address by Herbert C. Hoover, President, A. I. M. & M. E.*

9:30 P.M. *Informal Reception and Smoker.*

Saturday, Nov. 20, 1920

9 A.M. *Organization Meeting of the Executive Board of American Engineering Council.*

The first meeting of American Engineering Council has been called for Nov. 18, 19 and 20 at the New Willard Hotel, Washington, D. C. Every member society has at least one representative on the council. The program of this first meeting, as proposed by the Joint Conference Committee, is given herewith.

After the organization conference in Washington last June, the Joint Conference Committee of the four Founder Societies was appointed the *ad interim* committee of the Federated Societies. This committee has since issued bulletins from time to time, mention of many of which has been made in these columns, answering detailed questions as to the function and methods of operation of American Engineering Council. Copies of these may be obtained from the committee at 29 West Thirty-ninth Street, New York. They also tell of the past work of Engineering Council, which turns over its work and problems to American Engineering Council on Jan. 1, 1921, and of the important questions now before Engineering Council, which the new organization will have before it for consideration and solution.

Another aftermath of the Washington conference of June was the almost universal approval of the new organization, as reflected by the technical press of the nation. These editorial opinions and analyses of the Federated Societies were compiled and published as a booklet, called "Engineers Unite," by the McGraw-Hill Company. The opinions of engineers of the country, as reflected in this way, indicate the necessity for and interest in the proper functioning of the Federated Societies.

The Washington meeting will thus mark an important step in the engineering world and the beginning of the engineers' entrance into larger national affairs. Added to the interest of the business of the meeting itself will be the address of Herbert Hoover and other engineering leaders of national prominence.

New Terminal at Milwaukee Opened

Chicago, North Shore & Milwaukee Railroad Has Completed a Handsome Station at the North Terminus of Its Line Which Is Well Arranged to Serve Patrons and Unique in Inspection Facilities

THE NEW MILWAUKEE TERMINAL FRONTS ON SYCAMORE STREET AT SIXTH AVENUE, THREE BLOCKS FROM THE HEART OF MILWAUKEE

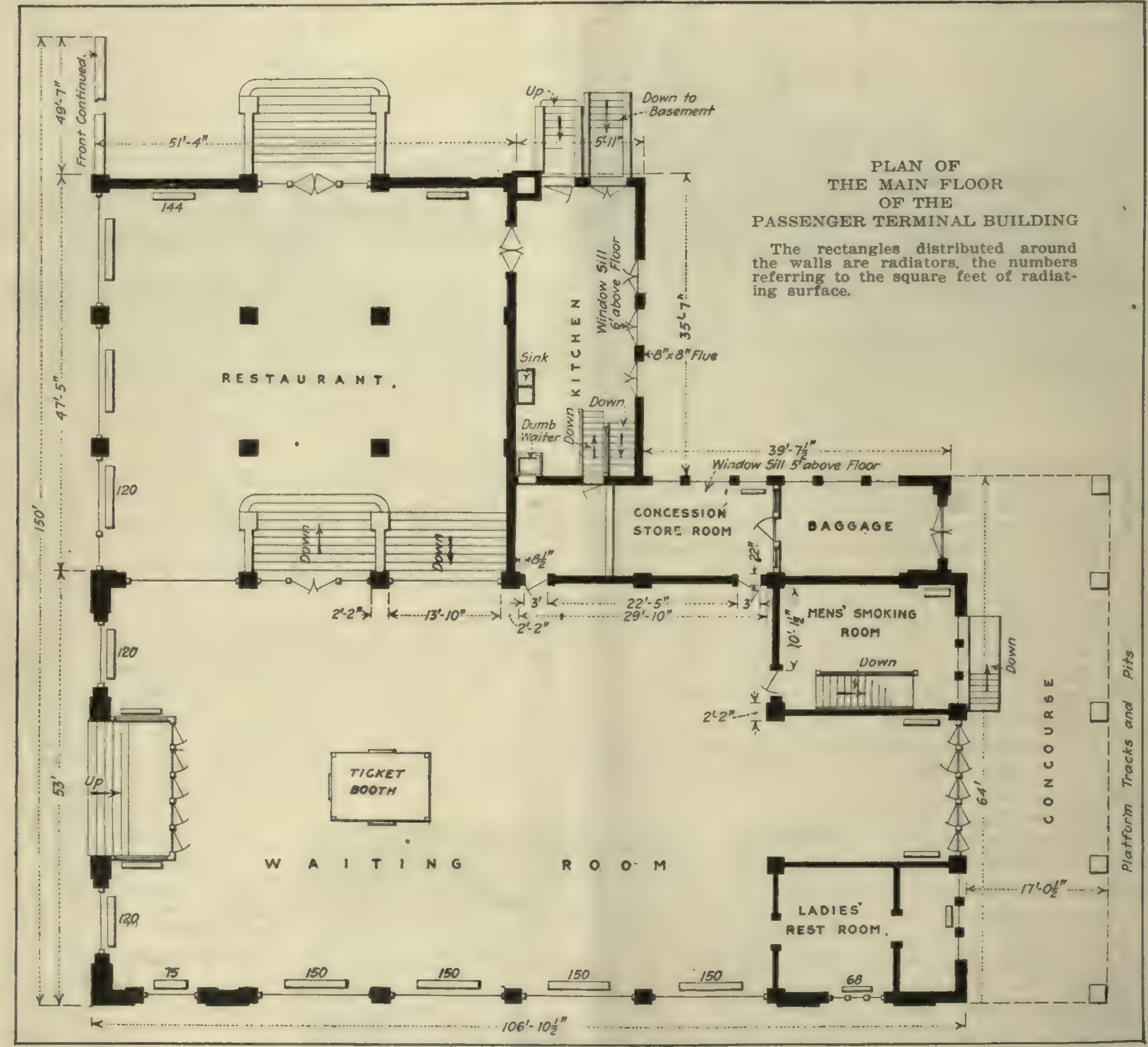
IN ORDER to secure adequate terminal facilities for the handling of its rapidly growing patronage and for the proper inspection of equipment, the Chicago, North Shore & Milwaukee Railroad purchased a site for, and recently completed the building of, a magnificent new station in Milwaukee, Wis. It is very well located at the northeast corner of Sycamore and Sixth Streets, one block south of Grand Avenue, which is the main business street of the city, and only three blocks from what is probably the center of the business district. Furthermore, Sixth Street is to be widened to 160 ft. and made the principal north and south thoroughfare of the city. Heretofore, the road has had a station which was satisfactory from the standpoint of the patrons, particularly the location virtually at the center of the business district, but unsatisfactory from the operating standpoint, since there were no terminal facilities for the cars except those afforded in the street.

For the formal opening of the new terminal, Britton I. Budd, president, sent out invitations to about two hundred business men, public officials, bankers, representatives of the chambers of commerce and other prominent citizens located along the line of the road to attend the ceremony in the new station. A special three-car train was run from Chicago to Milwaukee and luncheon was served in the "diner" to some eighty guests from Chicago and points en route. At Milwaukee Mr. Budd gave a luncheon at the Milwaukee Athletic Club to ninety-four guests, who went from there to the new terminal for the opening.

BRICK AND WHITE STONE ORNAMENTAL WALL TO THE REAR OF THE STATION ALONG SIXTH AVENUE

At the opening ceremony Phil Grau, secretary of the Milwaukee Chamber of Commerce, presided. Daniel W. Hoan, Mayor of Milwaukee; Walter Carlson, president Milwaukee Association of Commerce; Samuel Insull, chairman of the board North Shore Lines; Joseph R. Noel, acting president, and R. B. Beach, business manager Chicago Association of Commerce, and Mr. Budd addressed briefly the more than two hundred guests assembled. These included from Milwaukee, in addition to those already mentioned, five judges, twenty-four aldermen, twenty-one railroad men representing all the steam lines entering the city, the presidents of the Milwaukee Club, Milwaukee Athletic Club, City Club, congressmen and others. Similarly prominent men from other points along the line were present.

In his talk Mayor Hoan declared the new station to be the most modern and efficient railway terminal in America. In extending the greetings of the city to the railway officials, he said that he did so not only because of the excellent transportation facilities which the North Shore Line was giving to the residents of Milwaukee, but because of the splendid spirit of co-operation of the road's officials with the officers of the city. He remarked that if all utility managers would co-operate in the same spirit Milwaukee would be happy indeed. He spoke in a very complimentary way about the manner in which the North Shore Line had gone to unusual ends to relieve the distress in Milwaukee which prevailed during the railroad strike, and assured the company that the city officials were not unaware of what this company was doing for Milwaukee.


PLAN OF THE MAIN FLOOR OF THE PASSENGER TERMINAL BUILDING

The rectangles distributed around the walls are radiators, the numbers referring to the square feet of radiating surface.

In his brief address, Samuel Insull referred to the fact that the service on the North Shore Line is being perfected only through the expenditure of large sums of money, which can be obtained only as a result of holding the confidence of the people served. He said that in financing the improvements on the road the present management had had to cope with the disadvantage of the history of the road, it having gone through the courts, but that the officers were succeeding in developing a high-speed railroad, thanks to the co-operation of the city authorities all along the line and the state regulatory bodies, which had been very sympathetic and helpful when they had come to understand the policies of the road. He spoke with some pride of the fact that the North Shore Line was one of the very few roads in the country which had been able to continue the betterment work right through the period of high prices. He said that the policy pursued in the past had been to supply all equipment and facilities necessary to meet the traffic demands, and that the same policy would be continued, and he assured his audience that even though the business of the road continued to grow at the present rate, there would be provided ample means for handling it in the future. He concluded his talk by saying that the primary object of the management was to make the property a great financial success by establishing with the communities served a reputation for it as the "Road of Service."

Other speakers addressed many compliments to the operating officials for the splendid improvements which have been made in the operation of the road, and assured them of the whole-hearted co-operation which their policies deserve.

THE ATTRACTIVE MAIN WAITING ROOM WITH TICKET OFFICE IN CENTER, THE DOOR TO THE RIGHT LEADING TO RESTAURANT, A FEW STEPS BELOW

The opening of the new station marked the initiation of a new train service between Chicago and Milwaukee. A train known as the Badger Limited will leave Milwaukee daily at 4.30 p.m. and run through to Chicago in two hours and ten minutes. The running time of the other express trains of the North Shore Line is two hours and forty-five minutes, while competing steam lines cover the distance between Chicago and Milwaukee in two hours and ten minutes. The fare on the North Shore Line between Chicago and Milwaukee is $2.50, while the steam lines charge $3.30.

In general, the passenger terminal building, loading platforms and tracks and a new merchandise dispatch station occupy a strip of ground 420 ft. long by 150 ft. wide. It is a stub-end station, served by three tracks, two of which will accommodate five passenger cars and the third four, making a total capacity of fourteen of the standard passenger cars.

The passenger station is constructed of red tapestry brick with wide raked-out joints and all brick set with a template, giving a very attractive appearance. A composition wood and steel roof was used, the steel trusses having been erected in the areaway of the attic. The floor of the main waiting room was constructed of concrete covered with red tile, with variegated colored tile arranged in an art design. All of the white cement stone trim for the building proper and the ornamental wall extending along Sixth Street were cast on the job.

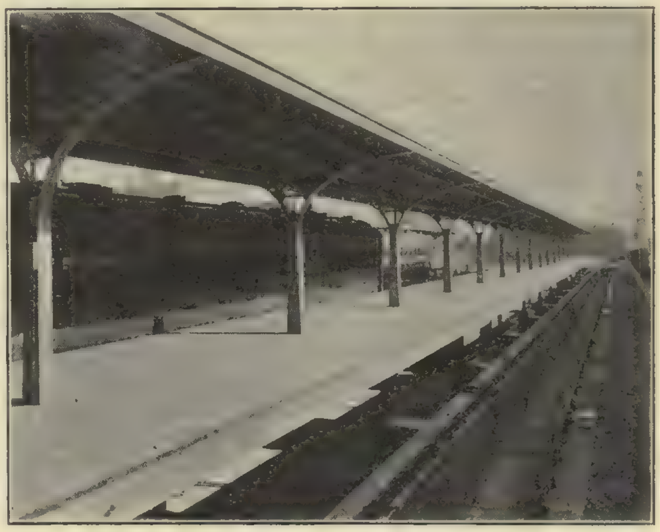
The smoking room and the ladies' rest room were finished off with terrazzo floors and likewise the stairs. The floors and walls in the toilet rooms were finished in white tile.

The main waiting room is made unusually light and attractive by the very large windows, extending practically from ceiling to floor along two sides. The ticket booth is arranged in a central position and heavy wood ornamental benches are distributed along the side of the room adjacent to the windows on the Sixth Street side. A confectionery and light-lunch concession, soda fountain, etc., occupies a position along the opposite side of the room, and behind this is a small room which serves as a storeroom and workroom for the concessionnaires and also as a parcel check room. A buff-colored beamed ceiling with ornamental lighting fixtures finishes off the waiting room.

On a slightly lower level, owing to the location of the building on a hillside, a fairly large restaurant has been built and equipped. This communicates with the main waiting room by a wide stairway and it is the idea that this restaurant will be used only at mealtimes. Lunches will be served from the concession in the main lobby at other times. A feature of the arrangement is that the kitchen serving the restaurant will also communicate with the concession by stairway, so that hot meats from the kitchen may be taken directly to the workroom behind the concession, where sandwiches and the like may be prepared.

The basement of the station will be utilized at present as a storeroom, with the south end set aside as a toolroom and workshop for the shop department inspectors. These basement rooms in the south end of the building communicate directly with the pits serving the three terminal tracks. In the basement also are provided a trainmen's room and a locker and report room, employees' toilet and another toilet room for concession employees. For the trainmen there are stairways leading to their room from the platforms and from the track

THE TRAINS MAKE A REVERSE CURVE OFF SIXTH AVENUE INTO THIS STUB-END TERMINAL, IN WHICH THE THREE TRACKS PARALLEL SIXTH AVENUE. MERCHANDISE DISPATCH TERMINAL AT RIGHT



A VIEW SHOWING THE PITS AND PLATFORM CONSTRUCTION, ENABLING INSPECTORS TO PASS DIRECTLY FROM ONE PIT TO ANOTHER. THE SPACE BENEATH THE PLATFORM IS OPEN level. The basement will be further finished off later on and a concession given to a barber shop and other patron conveniences.

In the areaway to the east of the station a space has been provided for the parking of ten or twelve automobiles so that any one may drive up to the station and leave his car off the street in a protected place while he goes to Kenosha, Chicago, or some other point on the line.

LOADING AND INSPECTION FACILITIES DISTINCT FEATURES

The south end of the main waiting room of the station opens through a group of doors onto a platform which connects with the two long loading platforms. Both these platforms are constructed of steel, one being an island platform 16 ft. wide with the overhead shelter centrally supported, while the other is a side platform 10 ft. wide with the roof supported on a single cantilever. Both of these platforms are supported on steel columns which rest on concrete walls, butt walls extending out from the track wall. The entire space underneath the platforms has been left open and openings provided at 50-ft. intervals in the track walls so that inspectors may pass from one pit to the others directly without the necessity to climb out of the pit or go around to the ends. The inspection facilities thus provided for looking after the equipment are a distinct feature of the new terminal. Two of these tracks are provided with a pit 260 ft. long, while the third track, which will generally be used for local cars, is provided with a pit 80 ft. long.

The rails for the terminal tracks are laid directly on the concrete walls which form the pit, without the use of any ties, giving full access to the equipment underneath the cars. The rails are set on ordinary tie plates, which in turn rest on ⅜-in. plates of lead used to protect the concrete from the impact of the wheels, the noise being somewhat deadened at the same time. Concrete stairways were built at the outer ends of all of the pits, while at the station end they communicate directly with the basement.

MERCHANDISE DISPATCH TERMINAL OCCUPIES ADJACENT POSITION

Adjacent to the new passenger terminal in Milwaukee is what is termed the new merchandise dispatch station of the North Shore Line, although a part of this building was built four years ago for the use of the express company which was then operating on the North Shore Line. Recently this building was extended 189 ft. to the north, after some old buildings belonging to the company had been wrecked and cleared away. This gives a freight station 341 ft. long and 30 ft. wide, arranged with two tracks which will accommodate twelve cars along one side of the building and a 20-ft. driveway in addition to the alley width along the opposite side of the building for teams and trucks. A central section of this building 51 ft. long by 60 ft. wide is of two-story brick construction. The first floor is open and is merely a continuation of the freight-handling floor. The second floor has been given over to office space.

This merchandise dispatch terminal may be seen to the right in one of the accompanying photographs. All merchandise dispatch business originating in or shipped to Milwaukee will be handled at this terminal, while the carload freight will be received at a station at Harrison Street, in the outskirts of the city.

B. J. Fallon, chief engineer, and A. U. Gerber, architect for the North Shore Line, are responsible for the engineering and architectural features of the new Milwaukee terminal.

Standardization of Overhead Line

A SUB-COMMITTEE of the Municipal Tramways Association has made a very interesting report on overhead line material and its standardization. The committee sent a questionnaire to all operating companies in England and found a remarkable condition in the industry as regards standardization. There were more than thirty different sizes and sections of trolley wire used; one firm alone manufactured fifty different sizes of insulated bolts; another firm had patterns for more than 1,000 different line ears, and in general a very great need for standardization was found.

The committee recommended No. 0 to No. 0000 as standard trolley wire sizes for future use, and as a result of many tests for strength, vibration and elongation it wrote a specification for the standard wire and groove. The committee also prepared specifications for overhead fittings and for steel span and guard wires, but was unable to recommend any insulator specification at this time. The trolley wire specifications conform to the standards of the A. E. R. E. A. in general, although the minimum tensile strength is less and the elongation differs slightly. For steel span and guard wires the committee fixed the tensile strength between the limits of 28 and 35 tons per square inch with an elastic limit not less than 35 per cent of the breaking stress. The breaking stresses of the various wires were specified as follows:

No. 8 S.W.G.	1,261 to 1,576 lb.
No. 7/12 S.W.G.	3,500 to 4,375 lb.
No. 7/14 S.W.G.	2,100 to 2,625 lb.
No. 7/16 S.W.G.	1,400 to 1,750 lb.

The wire must not show any copper after having been dipped three times in a copper sulphate solution, for one minute each time, at 60 deg. F., and the wire must also stand a bending test on a 1-in. thimble for all sizes excepting No. 8, which must stand the test on a 2-in. thimble.

In the specifications for the overhead fittings the gunmetal mixture is specified as follows: Copper, 88 per cent; tin, 10 per cent; zinc, 2 per cent. The tensile strength is not to be less than 15 tons per square inch, with an elongation on fracture of between 15 per cent and 20 per cent measured on an 8-in. length.

The malleable iron must stand a 90-deg. bend on a 1-in. radius without fracture and must have an ultimate tensile strength of 17 tons per square inch, with an elongation of 4 per cent in a 2-in. length. Hot galvanizing is to be used whenever galvanized fittings are to be used. The steel must show a tensile breaking strength between 25 and 35 tons per square inch, with elongations of 27 and 20 per cent respectively in a length of 2 in.

Composite fittings must stand a 2,500-volt insulation test after having been soaked in water for twenty-four hours and then dried. Double and single pull-offs must stand a straight pull of 1,500 lb. without distortion and a tensile stress of 4,000 lb. Straight line hangers must stand a stress of 3,500 lb. on the span wire. Globe insulators must stand a tensile stress of 5,000 lb. without fracture when heated to 100 deg. F. and the insulator bolts must be one-piece steel drop forgings.

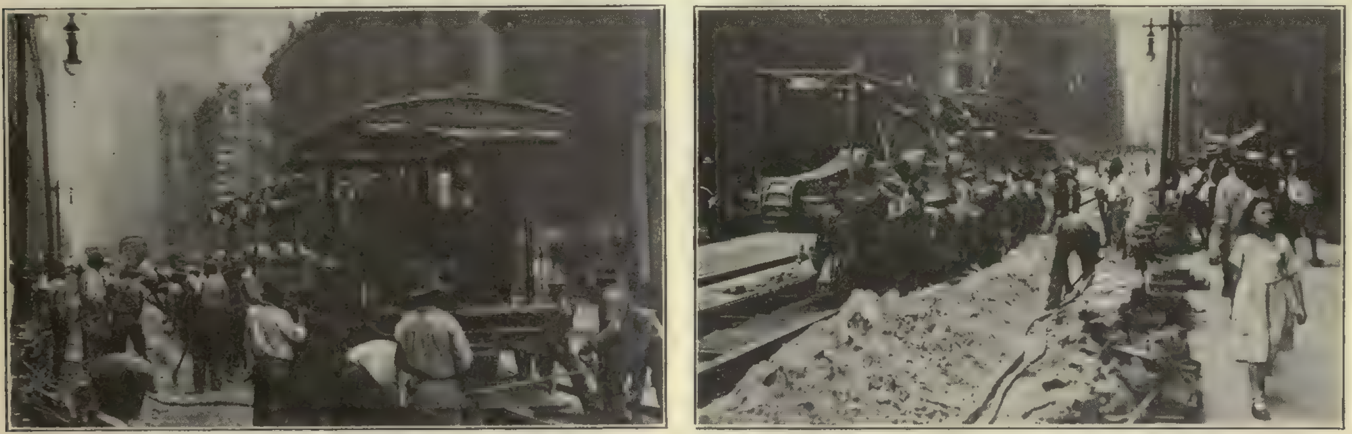
Relaying Downtown Track in St. Louis

Machines Played Important Part in Job on Olive Street, Where New Rails Were Laid on Old Foundation and One-Half the Street Was Left Open

RAIL renewal recently became necessary on Olive Street from Twelfth Street to Broadway, a distance of 2,195 ft., or 4,390 ft. of single track, in the heart of the business district of St. Louis, Mo. One track at a time was rebuilt, keeping the other half of the street open for one-way car and vehicular traffic, that in the other direction being diverted to other streets. The density of traffic in this locality made it highly important that the work should be accomplished in as brief a period as possible, and to this end a very extensive use of machines was called into play.

The old track on Olive Street was laid in 1906, with 6 x 8 in. x 7-ft. cypress ties set in a concrete base. The rails employed were 112-lb. 9-in. girders, Lorain section 333. These were fastened to the ties with hook-head spikes and the joints were cast-welded.

Examination of the track disclosed that the concrete base and most of the ties were in good condition and it was decided that the new rail should be relaid on the old foundation. While this complicated the work of bringing the new rails to alignment and grade, it saved the material necessary for constructing the concrete foundation and also the time and labor involved in removing this old concrete.



TWO VIEWS OF THE CONTINUOUS CONCRETE MIXER AT WORK ON OLIVE STREET, ST. LOUIS

The first step in the reconstruction of the track was to tear up the old rails. This was done by a special rail-breaking car which the company has employed in this work for a number of years. This powerful machine consists of a 50-ton two-drum hoist. The two cables are hooked over the ends of the two rails and the hoisting machinery is set in operation. This lifts the ends of the rails and breaks them in 7-ft. lengths, the breaking point of the rail having first been determined by burning a slot in one side of the rail base. As the two pieces of rail are pulled up they are separated by using an acetylene torch to burn off the tie rods at both ends. The sections of rail were later removed from the street, either by loading by hand onto a work car, using two men on a rail piece, or by dragging the pieces up skids mounted on the side of a special car which was described in the ELECTRIC RAILWAY JOURNAL for Sept. 13, 1919, page 531. In preparing for the rail-breaking machine a section of the pavement, 1 ft. square, was removed at the rail every 7 ft., in order to permit hooking the cable tongs under the base of the rail. The notches in the rail base were then burned.

As the rails were pulled up from their bed in the concrete the amount of the concrete which came with them varied from almost none at all, outside of the actual rail base width, to a considerable piece. Now and then a tie would pull out with the rail, and these, as well as the few deteriorated ties, were replaced in laying the new rails with pieces of old T-rail, thus avoiding the necessity to pick out the old tie seat in order to insert a new wooden tie. These pieces of rail were simply suspended from the bottom of the new rail in the seat of the old tie by using the regular rail clamp and bolting it through the base of the cross-tie rail.

No effort was made to preserve the old wood-block pavement as the rails were pulled up, as it was thought necessary to renew this anyway. After the rails were out of the way, therefore, it was necessary to strip the trackway of the paving block and all loose material. A considerable amount of labor with hand picks was then necessary to break away the concrete base further where it interfered with a proper bearing of the new 132-lb. 9-in. girder rail, Lorain section 440.

The new rails were then laid in place and roughly aligned and graded by temporary spiking through a tie now and then. The next step was to complete the joints. The Nichol joint used consists of two heavy loose-fitting angle bars, which extend under the base of the rail and up under the head, riveted together through the web of the rail by means of 16-in. $1\frac{3}{32}$-in. rivets. These rivets were heated in a small blacksmith's forge carried on the car on which was mounted the Hanna riveter. After the riveting was completed, the joint was filled with spelter, which not only serves to bring the angle bars into absolute contact with the rail but forms the bond as well. Tests made to determine the current-carrying capacity of these joints have shown the joint to have 120 per cent of the conductivity of the

MATERIALS SIDE DUMP SPREADER DISTRIBUTING A COURSE OF CRUSHED ROCK ALONG THE TOP OF THE SAND, PREVIOUSLY DISTRIBUTED IN THE SAME MANNER

MANNER OF DISTRIBUTING SAND, ROCK AND CEMENT IN PREPARATION FOR CONCRETE MIXER. AT THE LEFT ARE THE CEMENT SACKS THAT HAVE BEEN EMPTIED ALONG THE TRACK

rail. This Hanna riveter handles one rivet at a time and is capable of exerting an 80-ton pressure upon it. The United Railways has more than 10,000 of these Nichol joints in use, some of which have been in for eight years, and according to C. L. Hawkins, engineer maintenance of way, not one has ever broken down.

The task of bringing the rail to permanent grade and alignment was a particular job, under the conditions imposed from making use of the old concrete foundation. This was done by selecting certain ties on which the rail would rest at the proper grade, making use of a thin tie plate, and then adzing off other ties or building up above them with steel tie plates to obtain a uniform bearing of the rail on each tie. This involved more or less fitting and trying. For the purpose, tie plates of ¼ in., ⅜ in., ½ in., ⅝ in., ¾ in. and 1 in. thicknesses were supplied, all drilled with two diagonally opposite spike holes. Where two or three tie plates were used on one tie, it was necessary to place them evenly so that the spike holes would match up. Where the blocking up necessary was much more than 1 in. use was made of a 1 x 6 x 18-in. tie-board made of oak reinforced with two ¼-in. square rods with the ends bent over at the edges of the board, so that if the latter should split it would still be held together and form a substantial support.

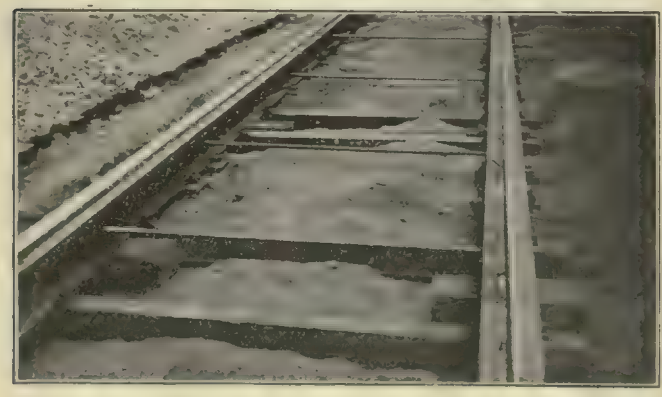
When the rail was at proper grade, ¾-in. holes were bored in the ties and 7-in. screw spikes driven through the rail clips and the tie plates. For boring the spike holes in the ties use was made of Duntley drills, and Duntley spike drivers were also used for screwing down the spikes, these small machines alone saving an immense amount of time and labor, according to the roadmasters, who were very enthusiastic about them.

Tie rods of ⅞ in. round section on standard 6-ft. spacings were used.

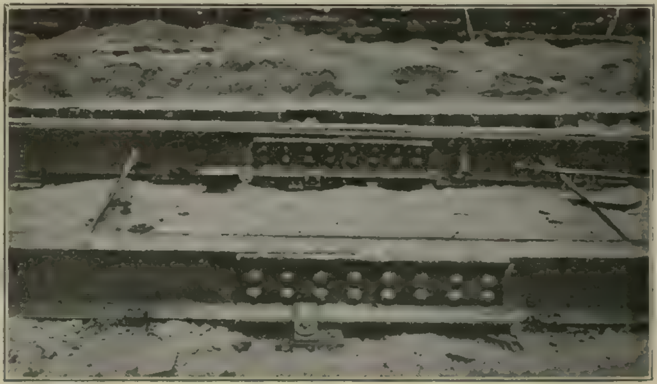
Concreting in followed the grading of the rails, and this was done with great rapidity through an efficient method of distributing the materials and the use of a continuous mixer, which is pictured herewith, though it has been in use by the company for a number of years and was described in this journal several years ago. This concrete mixer runs on the track that is to be concreted, gradually moving backward as the concrete is poured. The entire length of one track between Twelfth Street and Broadway was concreted in the time between 7 a.m. and 2 p.m. The capacity of the machine is said to be easily 450 ft. an hour.

Ahead of the concrete mixer a layer of sand, then one of crushed rock and finally cement are distributed along in a continuous pile in the proper proportions and in the quantity determined by the depth and width of the excavation. Then as the mixer proceeds a gang of men shovels these materials on the chain conveyor which carries the dry mix into the mixer. The materials are not dry mixed other than that which comes from simply shoveling the three materials collected in one pile onto the car.

The distribution of the sand and crushed rock was facilitated by two dump-spreader cars operated in a train, one of which was a trailer and the other a motor car. These dump-spreader cars are the newest addition to the company's track equipment, and while the officials feel that they are as yet somewhat crude in their work-



TIES THAT PULLED OUT OF THE CONCRETE FOUNDATION OR HAD DETERIORATED WERE REPLACED BY SECTIONS OF OLD T-RAIL



THE RIVETED AND SPELTERED JOINTS AND BOND WHICH HAVE GIVEN SATISFACTION FOR YEARS IN ST. LOUIS ing, they have greatly facilitated the work on this Olive Street job, and with some refinements are expected to be a big factor in the distribution of material in future trackwork. Each car comprises eight steel-lined boxes, each having a capacity of 64 cu.ft., which are so mounted on the car that when they are dumped the material clears the track on which the car is running by more than 3 ft. The operation in dumping the box is this: A heavy wood pin, which prevents the box from sliding to the right during transportation, is removed and a lock on the box is tripped. By a slight downward pressure on the top of the box end the box is caused to tilt to the right, when gravity causes it to slide outward sideways from the car until it reaches a limiting position, when it stops its sliding motion and the outer end pivots downward, dumping the material, as seen in an accompanying photograph. The car is then moved along slowly so that the material is distributed in the thickness, or quantity, required to give the 1 : 3.6 : 6.25 mix used. It is expected that a more detailed and complete description of this dump spreader will be available after it has been somewhat refined.

The concrete from the mixer was poured up to a level even with the tie rods and permitted to set. After this a 1-in. layer of grout was poured to form the paving foundation, the surface being smoothed off by pulling along the track a square drag, the four corners of which rest on the rails and the lower edges smooth off the surface of the grout at the proper level. The space underneath the flangeways of the rails was plastered full by hand with a 1:1 mix, the same as that used for the paving grout. After this grouting was dry a layer of pitch was put over it and the paving restored.

APPEARANCE OF TRACK SURFACE ON OLIVE STREET AFTER THE NEW CONCRETE HAD BEEN POURED

APPEARANCE OF TRACK AFTER GROUTING AND SURFACING (BETWEEN THE RAILS) READY FOR THE WOOD BLOCK PAVING

In distributing the material along the track for the concrete a system has been worked out such that the receiver is enabled to judge with great accuracy the amount of material to be dumped per foot of track. This is accomplished by means of a set of tables, which have been worked out so that by proper reference to car number and proper column for depth and width of excavation one may read off the proper thickness of material for the particular mix employed.

While the reclamation of old Nichol joints forms no part of the Olive Street job, it is interesting in the light of showing what disposition is made of these joints when they are taken out upon rail renewal. The pieces of rail comprising a joint are taken to the track store yard and a rivet gun used to cut off the rivet heads so that the angle bars may be removed. Inasmuch as these angle bars do not have any direct contact with the rail, they are usually undamaged after a long period of service. The spelter which is used to make an absolute bearing between the plates and the rail is then recovered by melting. Since the present worth of the spelter recovered per joint is about $2 and that of the joint plates is about $6, whereas the cost of labor involved is well under $2, it is seen that it is very profitable to go to the trouble of reclaiming these old joints. After the spelter has been melted off the joint plates are sandblasted and then dipped in hot tar oil to protect them from corrosion while in storage. They are then sandblasted again to remove this tar oil before reusing.

The estimated cost of the Olive Street job described was $54,000. The total time involved in completing the eastbound track was six days. The completion of the other track was delayed by a pavers' strike.

Relation of Standardization to Accident Hazard

IN A PAPER presented to the Association of Iron & Steel Electrical Engineers in New York on Sept. 20, Walter Greenwood, Carnegie Steel Company, Youngstown, Ohio, made some comparisons of the number of accidents in steel mills resulting in personal injuries to determine if possible the relation of standardization in electrical equipment to safety. Similar conditions exist in railway shops. He said that the analysis of results is convincing that standardization does reduce the accident hazard. Standardization of parts increases the quality, convenience and uniform arrangement of the controlling parts. The maximum hazard is reduced by quality in that breakage cannot occur unless capacity is exceeded. Capacity cannot be overtaxed where control is properly regulated. The uniform arrangement of controlling parts manually operated reduces hazard by reducing the liability of operating the wrong movement. Convenience reduces hazard by making situations and parts easily accessible. Interchangeability reduces the hazard and it classifies with convenience. Going back from the operating end, interchangeability simplifies construction and through efficiency in construction of interchangeable parts hazard is again reduced. Collectively considered, efficiency in maintenance reduces hazard, and this efficiency is increased by standardization. The most popular demand for standardization is on account of economy in production and operation. Accident hazard reduction is equally important.

Novel Type of Paving Successful in Toledo

Alternate Rows of Brick and Wood Blocks Provide Composite Paving Having Merits of Both—In Use Since 1916

By A. Swartz
Assistant Manager of Railways Toledo Railways & Light Company, Toledo, Ohio

The city authorities of Toledo use creosoted wood block for paving residential and business streets quite extensively. This class of paving has been used on a number of streets where the street railway tracks operate and the track strip has been paved with the same material. When the writer first came with the railway we were paving with wood blocks, using a nose block that fitted under the head of the rail. Without going into the details of the troubles that have appeared from various causes with our wood block pavement we tried an experiment which we thought would overcome some of these troubles.

We have very little complaint on the subject of wood block pavement and are thoroughly convinced of its practicability for street railway. We determined to lay a paving consisting of one row of vitrified paving brick and the next row of wood block, using nose blocks next to the rail. A strip of track about 300 ft. long was thus laid in the summer of 1916.

The blocks were laid on a ½-in. cushion of sand on top of a concrete foundation. The wood blocks were laid about ⅛ in. higher than the paving brick, with the idea that the edges of the wood block would mash down and cover the joint between the block and the brick, by way of protecting the brick from chipping on the edge.

This method was also intended to provide a foothold for horse traffic and at the same time furnish a paving which would be easily and quickly gripped by automobile tires in any kind of weather.

Pavement Is Good for Vehicles

There seems to be no question about the riding qualities, for vehicular traffic, of this type of pavement, and the surface condition of the paving during this tryout period has remained almost the same as when it was first laid. The wood block has mashed down and has provided an almost impervious pavement and we are very well satisfied with the results.

In the summer of 1918 we laid one block of this paving on double track in the busiest part of the downtown section, with results so far the same as we found on the original experimental strip. On the latter stretch of track we operate eleven lines of interurban cars, which involve the passing each day of 560 cars weighing an average of 70,000 lb. each, as well as five city lines operating 800 cars per day weighing about 36,000 lb. each. This gives a total of about 125,000,000 tons and 4,000,000 car wheels per year passing a given point on this track. This traffic is certainly heavy enough to demonstrate the qualities of the pavement with relation to the track.

This information is given to the readers of the Electric Railway Journal so that those who wish may profit by the experiment that we have been making.

There is another point in connection with this type of paving, namely: Every street railway is in a business way expected to give its patronage to various manufacturers and local dealers in all kinds of supplies. Paving supply companies expect railways to buy bricks and wood-block manufacturers expect them to buy blocks, and there is no reason why railways should not patronize both interests.

Financial Situation of English Municipal Tramways

According to *L'Industrie des Tramways et Chemins de Fer* (the *Tramway and Railway Industry*), which quotes official statistics prepared by M. J. Beckett, general secretary of the Association of Municipal Tramways of Great Britain, many of the British municipal undertakings are in a precarious condition.

An examination of the results obtained during the fiscal year 1918-19 on the sixty-six municipal tramway systems leads to the following figures:

Receipts per car-mile	Number of systems
Between 13 and 14 pence	1
Between 15 and 16 pence	5
Between 17 and 18 pence	6
Between 18 and 19 pence	8
Between 19 and 20 pence	10
Between 20 and 21 pence	9
Between 21 and 22 pence	[illegible]
Between 22 and 23 pence	6
Between 23 and 24 pence	5
Between 24 and 25 pence	2
Between 25 and 26 pence	1
Between 26 and 27 pence	1
Between 27 and 28 pence	3
Between 30 and 31 pence	1
	66

Crowding and overloading are general on most systems at certain hours of the day and during week-ends. The growth in the number of passengers carried per car-mile is extremely marked from 1913 to 1919.

From the results of the year 1918-19, the last on which complete returns are available, it appears that:

Fifty-seven systems show a surplus, without its being possible to set anything aside as a reserve for replacements and renewals, of £1,381,153, while nine systems show a loss of £23,669, so that for all sixty-six systems the surplus is £1,357,484.

On the basis of the very low rate of 1d. per car-mile for renewals, the sum which ought to be set aside for renewals is £916,913. There remains then only a margin of about £440,551. From budget allowances for 1920-21 apparently only twelve systems will produce a surplus.

Food Prices Coming Down

According to a report of the United States Department of Labor, recently issued, the average family expenditure for twenty-two articles of food decreased from July 15 to Aug. 15 in each of the fifty-one cities from which monthly prices are secured.

In Minneapolis the decrease was 11 per cent; in St. Paul, 10 per cent; in Detroit, 9 per cent; in Chicago, Cleveland, Indianapolis, Kansas City, Milwaukee, Omaha, Peoria and Springfield, Ill., 8 per cent; in Denver and Memphis, 7 per cent; in Butte, Cincinnati, Columbus, Newark, New York, Philadelphia, Pittsburgh, St. Louis, Salt Lake City and Seattle, 6 per cent; in Baltimore, Birmingham, Bridgeport, Buffalo, Dallas, Fall River, Louisville, Manchester, Rochester and Washington, D. C., 5 per cent; in Atlanta, Boston, Houston, Los Angeles, Mobile, New Haven, Portland, Maine, Portland, Oregon; Providence, San Francisco, Savannah and Scranton, 4 per cent; in Little Rock, New Orleans and Norfolk, 3 per cent; in Jacksonville and Richmond, 2 per cent, and in Charleston, 1 per cent.

PUBLICITY
for the Electric Railways

Publicity as a Byproduct in Toledo

The Railway Company Utilizes the Installation of Expensive Special Trackwork to Emphasize the Magnitude of Necessary Investment

THE Toledo Railways & Light Company has just completed the installation of an extensive piece of special trackwork at the intersection of Jefferson Avenue and Summit Street. This piece of work cost more than $30,000 and the company utilized the public interest in the job to advertise its cost. For this purpose a large sign was prepared, and mounted on a nearby trolley pole, with the total cost and some of the detailed costs tabulated thereon in bold letters. The sign and a part of the track layout are shown in an accompanying illustration.

The lettering on the sign is as follows: "This work will cost $30,479. Trackwork—materials $10,006, labor $7,950; paving—materials $2,734, labor $1,000; foundation—materials $3,950; labor $5,000; total $30,479."

In order to utilize the advertising possibilities of this work still further, the company printed in the current issue of *Sparks*, the official organ of the Doherty Fraternity and Sorority, some data regarding the special trackwork which could be used by employees in conversation with patrons. The points made were briefly these: Installation similar to this one would have cost about $12,000 in 1915. This layout weighs, exclusive of straight rail, approximately 41 tons. Its cost delivered at the Central Avenue yards was 10.2 cents per pound. Four hundred and eighty-five ties, each costing about $1, including freight and unloading, were used. The layout contains 756 ft. of 100-lb. rail. This rail cost $1.09 per foot, whereas the pre-war price of such rail was about 50 cents. Each track bolt used cost 13 cents, as compared with 6 cents five years ago. Two thousand bags of cement were used in providing a foundation. Based on the average labor rate this job will represent a total of 25,364 man-hours, or 3,170½ eight-hour days.

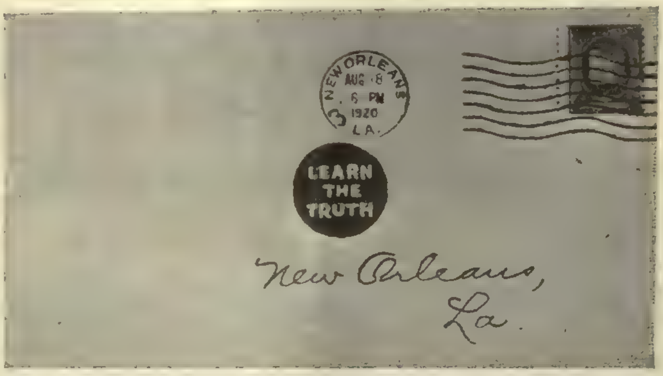
Under present schedules 996 cars turn at this intersection daily and 1,203 cars pass through on Summit Street, making a total of 2,199 car movements per day over this special trackwork. These figures are exclusive of interurban and tripper runs which do not follow regular routes.

Do Persistent Publicity and an Advertising Slogan Pay?

PROPOUND this question to William J. Baldwin, director of publicity, New Orleans (La.) Railway & Light Company, and he probably would say, "Let's see if they do." Then, in all probability, he would reach down into a drawer of his desk, or into a pigeonhole, and pull out an envelope, facsimile of which is here shown.

Mr. Baldwin has never doubted the value of judicious advertising and an advertising slogan, but he just

ADVERTISING SIGN USED IN TOLEDO TO IMPRESS UPON PUBLIC THE COST OF A PIECE OF SPECIAL TRACKWORK



THIS ENVELOPE PROVES THAT ADVERTISING SLOGANS PAY

could not resist the temptation to give his publicity work down in Crescent City an acid test. Accordingly, he wrote to himself. Instead of addressing the letter in the usual way, he clipped one of the little "Learn the Truth" slogans from a local newspaper, pasted it on the face of the envelope, wrote the words "New Orleans, La.," underneath the slogan, dropped the letter into a mail box and awaited results. The following morning the letter was duly reposing on his desk, having gone through the regular channels of Uncle Sam's post office and back to the writer. The significance is this: If nobody else in New Orleans is familiar with the railway's advertising slogan, Uncle Sam's postal forces are.

The "Learn the Truth" slogan was adopted by Mr. Baldwin when he first took charge of his company's publicity work, about one year ago. From that day until this the slogan has appeared in all of the company's advertising. It has become a household expression, a subject for jest and a purveyor of truth, so forcefully presented as to win for the railway company the confidence of thousands who formerly accepted the company's statements with a grain of salt.

So thoroughly established is this slogan, a stranger on entering the city could ask the first person he meets to direct him to "Learn the Truth" and straightway he would be directed to the offices of the New Orleans Railway & Light Company.

The Next Step in Publicity Work

Extraordinary Educational Power of Motion Pictures Should Be Capitalized by the Railways—A Nationalization of Such Publicity Suggested to Begin With and a Follow-Up Picture Dealing With Local Particulars

An Editorial Suggestion

WHAT is the next step in Publicity Work? What additional means can be utilized for putting the story of the electric railways and their transportation and economic problems before the public?

What about the motion picture? Does not the "movie" offer a tremendously powerful educational medium through which to reach the public and of which the electric railway industry should make full use? So far, this industry has made practically no use of the "movie" and yet many manufacturers and commercial organizations have seized upon this means of putting the story of their products or their business before the public.

The motion picture is a unique publicity medium. Unlike newspaper publicity, that put forth through the silent drama is read by 100 per cent of the subscribers, and, in addition, a much clearer comprehension of the theme is obtained by the average person when it is visualized in motion pictures. Furthermore, the percentage of newspaper subscribers who read publicity matter as printed in behalf of an electric railway is probably very small. Likewise, the number of passengers who will "take one" of the company's own leaflets from the little box on the car is a very small proportion of the total number of riders served.

This is not meant to be a disparagement of the good that can be derived from printed publicity, but what is meant is to point out what is believed to be a quicker, more direct, more perfect medium for use in the essential problem of gaining the confidence and co-operation of the public through understanding. It should be used not to the exclusion of printed publicity, but as a strong addition thereto.

An incident which brought this point out quite forcibly occurred in Detroit and was related in the ELECTRIC RAILWAY JOURNAL, May 22, page 1071. A few months ago, when the people of that city were about to vote on the question of whether the city should engage in the street railway business in competition with, or to the exclusion of, the Detroit United Railway, the Mayor became alarmed a few days before the election that his pet project was not going to carry. Some one conceived the bright idea of making a final presentation of the municipal plan in the moving picture theaters. A Chicago film company was hastily summoned and a thousand feet of film prepared.

This film flashed a map of Detroit on the screen and then showed by animated drawings just how workmen living in certain sections of the city have to take a very circuitous route with several transfers to get to work in another section. Then actual scenes were shown picturing greatly overcrowded cars, cars that would not stop and other exasperating things. By various scenes of this latter kind, the audiences got all worked up, so the report goes, against the alleged deficiencies and inadequacies of the company's service.

Then, reverting to the city map, the proposed municipal lines were built in before the eyes of the audience, which could hardly help but be impressed with what a great convenience these new short-cut lines would be in the daily transportation problem. In other words, the municipal plan was visualized for the public in its completed aspects as it never had been visualized from the printed descriptions. The people thought "what a fine thing that would be" and many attribute the positive vote to the effects of the film. Yet it cannot be contended that the people were not informed of the true outlook of the project, for the Detroit United Railway certainly laid bare the bones of the municipal plan with all the force at its command.

The main point of this Detroit incident is that the motion picture visualized the plan for the public and probably assisted in putting the bond election over, when it was thought to be lost. What the railways want to do is to use the power of the "movie" to put over the truth. Incidentally, such uses of the film as that in Detroit point to the desirability of the railways acting promptly to the features of the "movie" before opponents take advantage of them in any local controversy.

HOW CAN MOTION PICTURES BE USED?

The question immediately arises as to how motion pictures can be employed to present to the public the prosaic story of the electric railways. The first aspect of this question is obviously the film itself. Of course the success of any motion picture publicity will depend on the character of the film. And just now this part of the problem seems formidable, but that is because we in the railway business are not trained in motion picture psychology and technic. The planning and execution of the film should be left largely to the men who make that their business, although the intricacy of the railway problem will doubtless require the generous co-operation of the railway officials, at least for a time until the motion picture industry produces some man with a genius for this particular field. The fundamentals of such films can be set forth, however, and they are these—the films must be acceptable and interesting to the public; they must be acceptable to the motion picture theater managers, and they must carry their mission. Assuming, then, that good railway publicity films can be produced (not easily at first, perhaps, but if enough good heads get to work on the problem, a satisfactory result will be accomplished) a few suggestions may be in order.

It is rather costly to produce a film. The charges of the producer will vary per foot of film, depending on equipment and personnel needed, setting, the special lighting required, amount of art work, etc., averaging perhaps over $2 per foot. This makes this form of publicity prohibitive for the small railway companies and suggests a broader plan.

A great many phases of the street railway problem are common to practically all cities and will permit of uniform treatment. This points to the logic of some one undertaking to develop a thousand or two thousand feet of film, or perhaps a series of 1,000-foot pictures, dealing with these common aspects and then making this picture available for use in all the cities where there are street railways. Such a film would be solely a "good-will" picture, for that is the primary need in every city, and it would make no mention of fares or any subject which might not be timely from a local standpoint.

The distribution and showings could be arranged by one of the film companies or, more logically in this case, through the local railway company in each city. A showing of an educational film can be secured in almost any theater, sometimes without charge and sometimes upon payment of a small sum. If the railway used window posters advertising "William S. Hart in 'The Deep Purple' at the Blackstone Theater tomorrow," the theater manager would undoubtedly take advantage of that free advertising and be glad to run the railway film in return. Incidentally such car advertising would be ideal from the railway standpoint, for it would induce a large attendance at the theater showing the railway film and would cost but little.

No amount of time and thought would be too much to spend in producing this national railway film, in order to make it a picture which would "take" and at the same time really perform its mission.

There are half a dozen film producers eager to start such an undertaking, but who shall be sponsor for it? It might be taken up by the publicity committee of the American Electric Railway Association, or, better still, it might form a major part of the general publicity work of the Committee of One Hundred. If the right film is conceived and produced, it appears, and this opinion is shared by a number of railway executives with whom the proposition has been discussed, it would serve a tremendous influence in converting public distrust and condemnation into sympathetic understanding and approval. It has been estimated that such a film could be produced for from $3,000 to $5,000 and some 20,000,000 to 30,000,000 people effectively reached in the course of a few months by securing an adequate number of duplicate films or prints made from the original. The cost of these prints and the small theater expense would be in addition to the $3,000 first cost.

The uses to which such a film could be put are self-evident and this general film could be followed by films of local interest to bring out the details of local problems. What is an expenditure of $1,000 to $3,000 for a company, if it will gain the public's understanding and co-operation?

MOTION PICTURES HAVE BEEN USED

The proposed use of the motion picture in street railway work is not wholly without precedent. Last winter the New Orleans Railway, Light & Power Company used a motion picture film in several of the local theaters to present publicity matter on the railway situation. This film simply carried reading matter without trying to lend interest to the real message through pictures, or provide a story as the vehicle to "get over" the railway's true situation. Nevertheless, even this bold use of the movies was very helpful. The Kansas City (Mo.) Railway is having a film made the object of which is to give the local people a better understanding of the immense variety and extent of the plant that is required to enable the company to furnish transportation. The Chicago, North Shore & Milwaukee Railroad has had a film produced the object of which is purely to stimulate traffic through appealing to the interest of the public in speed and comfort and good scenery in traveling. By weaving in some romance of the historic Indian days that preceded the interurban line the film holds an audience and carries its mission.

There have been a few other instances where the "movie" has been employed by an electric railway, but there has been no real appreciation of the possibilities of the motion picture as a medium for reaching the understanding of the public. One prominent railway executive concluded a discussion of this idea by saying that "even though it might turn out a failure (and he didn't think it would), it is certainly worth trying, for it has such great potentiality, and we would be *doing something* and not just sitting by while the industry flounders." The crux of the idea is in getting the right kind of scenario and then in picturing it well. This is considerably more than a one-man or a one-mind job. That is why the association could well undertake the work, for it is organized to call in the best brains in the industry to co-operate with the scenario writers of the film producers to develop a masterpiece in educational films, for that is what is wanted.

The suggestion is made at this time in this preliminary way to invite criticism and suggestion—to learn something of the reaction of the men in the industry toward the various suggestions made herein and to arouse some discussion of new publicity machinery at the coming convention.

"No-Accident Week" Publicity

EARLY in the past summer a number of men interested in public safety and in the reduction of accidents in the industries and utilities organized the "1920 Safety Committee," and concentrated publicity upon the control of accidents during the week of June 6 to 12. Data have recently become available showing the result of this work. Hundreds of employers in New York and Pennsylvania co-operated, with the result shown in the accompanying table.

The data given are furnished by the Utilities Mutual Insurance Company, this being the best source of information by which to gage the result of the campaign. This company reports that whereas its data for this year cover about 46 per cent more employees than those for last year, the days of lost time are but one-fifth of what they were.

The costs given in the table are the total reserves set up for medical expense and compensation payments. Furthermore, fatalities are reduced to working days on the basis of twenty-five years, or 7,500 working days each, so that one fatality cuts a very large figure in the returns.

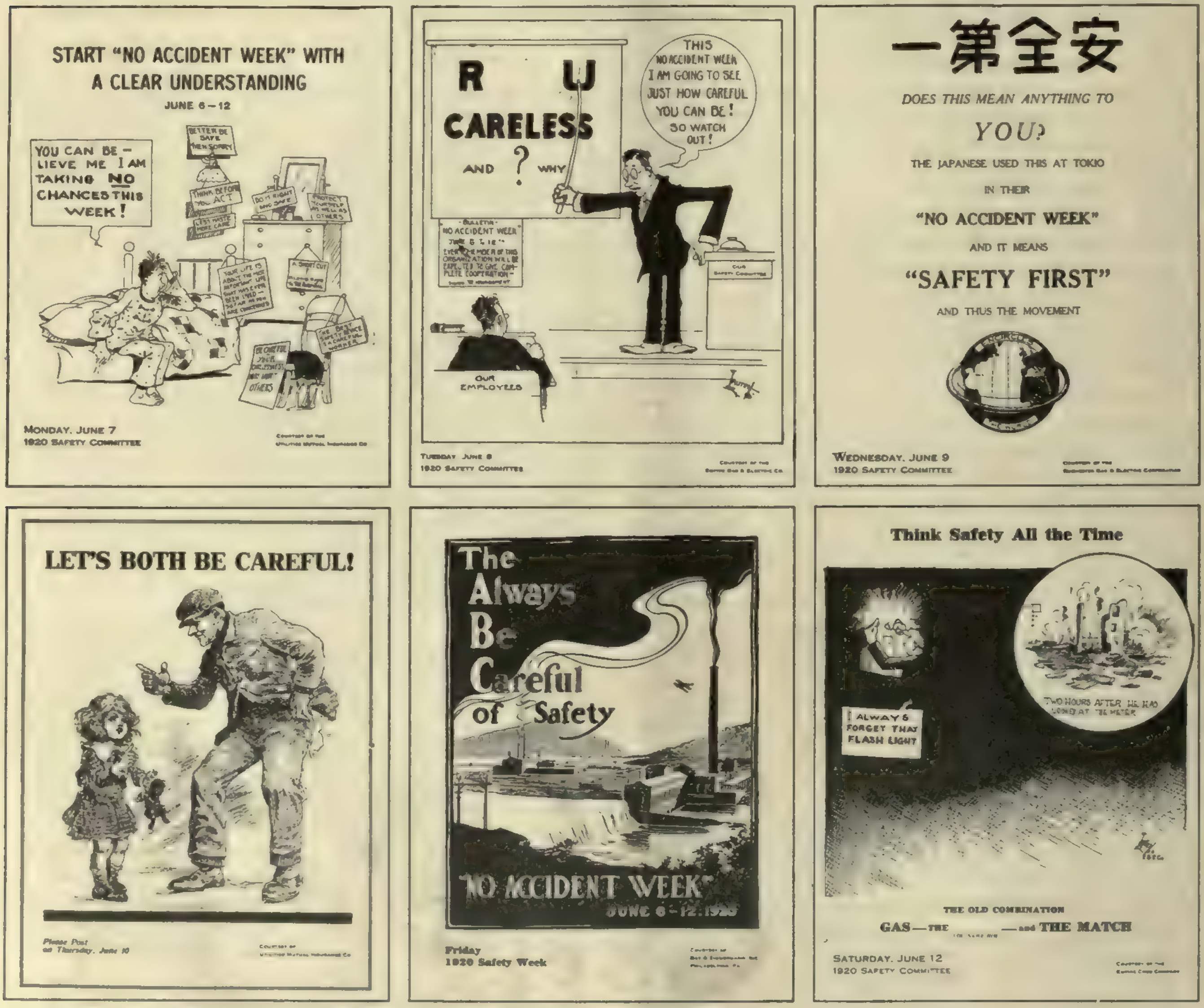
In studying the table it may be of interest to know that the number of employees covered by the 1920 report is about 15,000.

	June, 1919			June, 1920	
Week:	Days Lost Time	Cost	Week:	Days Lost Time	Cost
First	......	.....	First	22,896***	..
Second	15,862**	$18,362	Second	7,752*	$6,260
Third	15,490**	15,319	Third	306	1,150
Fourth	8,029*	4,607	Fourth	210	1,102
Totals, 3 weeks	39,381	$38,388		8,268	$8,512

* One fatality. ** Two fatalitities. *** Three fatalities.

Special dodgers, bulletins and posters were used in connection with the campaign, samples of the bulletins being reproduced herewith. Four colored posters, 14 in. x 17 in. in size, were the main advertising feature in the campaign.

This information regarding the work of the 1920 Safety Committee has been furnished by G. R. Rinke, secretary of the committee, who is connected with the Utilities Mutual Insurance Company, New York City.


START "NO ACCIDENT WEEK" WITH A CLEAR UNDERSTANDING
JUNE 6 – 12
YOU CAN BE-LIEVE ME I AM TAKING NO CHANCES THIS WEEK!
BETTER BE SAFE THEN SORRY
THINK BEFORE YOU ACT
LESS HASTE MORE CARE
DO IT RIGHT AND SAFE
PROTECT YOURSELF AS WELL AS OTHERS
A SHORT CUT
THE BEST SAFETY DEVICE IS A CAREFUL WORKER
OTHERS
MONDAY, JUNE 7
1920 SAFETY COMMITTEE
R U CARELESS AND ? WHY
THIS NO ACCIDENT WEEK I AM GOING TO SEE JUST HOW CAREFUL YOU CAN BE! SO WATCH OUT!
BULLETIN
NO ACCIDENT WEEK
OUR SAFETY COMMITTEE
OUR EMPLOYEES
TUESDAY JUNE 8
1920 SAFETY COMMITTEE
一第全安
DOES THIS MEAN ANYTHING TO
YOU?
THE JAPANESE USED THIS AT TOKIO
IN THEIR
"NO ACCIDENT WEEK"
AND IT MEANS
"SAFETY FIRST"
AND THUS THE MOVEMENT
WEDNESDAY, JUNE 9
1920 SAFETY COMMITTEE
LET'S BOTH BE CAREFUL!
Please Post on Thursday, June 10
The Always Be Careful of Safety
"NO ACCIDENT WEEK"
JUNE 6-12:1920
Friday
1920 Safety Week
Think Safety All the Time
I ALWAYS FORGET THAT FLASH LIGHT
TWO HOURS AFTER HE HAD LOOKED AT THE METER
THE OLD COMBINATION
GAS—THE ——and THE MATCH
SATURDAY, JUNE 12
1920 SAFETY COMMITTEE

BULLETINS USED IN THE 1920 SAFETY COMMITTEE'S "NO-ACCIDENT WEEK" CAMPAIGN

American Association News

MOTOR BUSES AND TRUCKS, FUEL SUPPLY, FREIGHT AND EXPRESS TRAFFIC, LABOR PROBLEMS, ELECTRIFICATION, SUPER-POWER SURVEY AND AUTOMOBILE HAZARDS ARE AMONG THE TOPICS CHOSEN FOR CONSIDERATION AT ATLANTIC CITY

Atlantic City Convention Programs

American and Affiliated Associations Have Provided Programs Which Are Marked by Concentration Upon a Few Topics of Pressing Importance

THE following tentative program has been prepared. While this is revised up to the hour of going to press it is understood that some slight revision may still be necessary.

PROGRAM OF AMERICAN ASSOCIATION

MONDAY, OCT. 11

9:30 a.m. to 5 p.m.

Registration and distribution of badges at booth, right of entrance, Young's Million Dollar Pier.

TUESDAY, OCT. 12

9:30 a.m. to 12:30 p.m.

Meeting held in Greek Temple

Annual address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of convention committees.

(a) On resolutions.

(b) On nominations.

(c) On recommendations in the president's address.

Reports of committees:

(a) On compensation for carrying United States mail.

(b) On electrolysis.

(c) On national relations.

Address on "Problems of Fuel Supply," by Eugene McAuliffe, president Union Colliery Company, St. Louis, Mo.

Reports of committees:

(d) Committee of One Hundred.

(e) On publicity.

Discussion of the report of the Federal Electric Railways Commission.

WEDNESDAY, OCT. 13

9:30 a.m. to 12:30 p.m.

Meeting held in Greek Temple

Reports of committees:

(a) On fare systems.

(b) *Aera* advisory.

(c) On company membership.

Papers on "Possibilities of Transporting Other Than Passengers."

(a) Urban and suburban lines, name of speaker to be announced.

(b) Interurban lines, by Britton I. Budd, president Metropolitan West Side Elevated Railway and Chicago, North Shore & Milwaukee Railroad, Chicago, Ill.

Paper on "Training of Electric Railway Personnel," by Martin Schreiber, manager Southern Division, Public Service Railway, Camden, N. J.

Address on "Settlement of Labor Disputes in the Interest of the Public and Its Influence on Fares," by Hon. Henry J. Allen, Governor of Kansas.

THURSDAY, OCT. 14

9:30 a.m. to 12:30 p.m.

Meeting held in Greek Temple

Report of committee on valuation.

Paper on "Rate of Return," by Cecil F. Elmes, engineer Sanderson & Porter, Chicago, Ill.

Paper on the "Place of the Motor Bus," by Frank C. Pick, commercial manager London Electric Railway, London, England.

Paper on "The Place of the Motor Bus as a Supplement to Electric Railways," by R. Gilman Smith, Milwaukee Railway & Light Company, Milwaukee, Wis.

Address on "The Motor Vehicle—Competitor or Ally?" by G. M. Graham, vice president Pierce-Arrow Motor Car Company, Buffalo, N. Y.

Address on "An Outside View of the Electric Railway Industry," by Melville E. Stone, general manager Associated Press.

Reports of convention committees:

(a) On recommendations in the president's address.

(b) On resolutions.

(c) On nominations.

Unfinished business.

General business.

Election of officers.

Installation of officers.

Adjournment.

PROGRAM OF ACCOUNTANTS' ASSOCIATION

MONDAY, OCT. 11

9:30 a.m. to 12:30 p.m.

Registration and distribution of badges at booth.

2 to 5 p.m.

Meeting held in Accountants' Hall

Annual address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of convention committees:

(a) On resolutions.

(b) On nominations.

Joint meeting with Transportation & Traffic Association.

Report of committee on collection and registration of fares.

TUESDAY, OCT. 12

2:30 to 5 p.m.

Meeting held in Accountants' Hall

Reports of committees:

(a) Accounting-claims.

(b) Accounting-engineering.

(c) On standard classification of accounts.

Paper on "Cost-of-Service Accounting," by H. J. Davies, secretary-treasurer Cleveland Railway, Cleveland, Ohio.

Paper on "Accounting for Material Received and Used, Including Inventories," by R. A. Weston, certified public accountant, New Haven, Conn., formerly general storekeeper New York, New Haven & Hartford Railroad.

WEDNESDAY, OCT. 13

2:30 to 5 p.m.

Meeting held in Accountants' Hall

Paper on "Financial Problem Confronting Public Utilities During the Period of Reconstruction," by Harry E. Mendes, member of Touche-Niven & Company, certified public accountants, Cleveland, Ohio.

Paper on "The Accounting Profession," by George L. Vannais, certified public accountant, Hartford, Conn.

Reports of convention committees:

(a) On resolutions.

(b) On nominations.

Election of officers.

Installation of officers.

Adjournment.

PROGRAM OF ENGINEERING ASSOCIATION

MONDAY, OCT. 11

9:30 a.m. to 12:30 p.m.

Registration and distribution of badges at booth.

2:30 to 5 p.m.

Meeting held in Engineers' Hall

Annual address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of committee on resolutions.

Report of committees:

(a) On equipment.

(b) On heavy electric traction.

TUESDAY, OCT. 12

2:30 to 5 p.m.

Meeting held in Engineers' Hall

Meeting of purchasing agents and storekeepers.

Papers on "Standardization and Its Effect on Stores," as follows:

"From a Storekeeper's Standpoint," by P. F. McCall, storekeeper South Side Elevated Railway, Chicago, Ill.

"From the Purchasing Agent's Standpoint," by a purchasing agent.

Joint meeting with Transportation & Traffic Association.

Meeting held in Transportation & Traffic Hall

Report of committee on safety-car operation.

Address on "Electrification of Railroads," by A. H. Armstrong, chairman electrification committee General Electric Company, Schenectady, N. Y.

WEDNESDAY, OCT. 13

2:30 to 5 p.m.

Meeting held in Engineers' Hall

Reports of committees:

(a) On power distribution.

(b) On power generation.

Address on "The 'Super-Power' Line," by W. S. Murray, chairman Super-Power Survey, United States Geological Survey.

THURSDAY, OCT. 14

2:30 to 5 p.m.

Meeting held in Engineers' Hall

Report of committees:

(a) On way matters.

(b) On buildings and structures.

General business.

Election of officers.

Installation of officers.

Adjournment.

PROGRAM OF TRANSPORTATION & TRAFFIC ASSOCIATION

MONDAY, OCT. 11

9:30 a.m. to 12:30 p.m.

Registration and distribution of badges at registration booth.

2:30 to 5 p.m.

Meeting held in Greek Temple

Annual address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of convention committees:

(a) On resolutions.

(b) On nominations.

Joint meeting with the Accountants' Association.

Report of committee on collection and registration of fares.

Joint meeting with Claims Association.

Report of committee on code of traffic principles.

TUESDAY, OCT. 12

2:30 to 5 p.m.

Meeting held in Greek Temple

Joint meeting with Engineering Association.

Report of committee on safety-car operation.

WEDNESDAY, OCT. 13

2:30 to 5 p.m.

Meeting held in Greek Temple

Report of committee on economics of schedules.

THURSDAY, OCT. 14

2:30 to 5 p.m.

Meeting held in Greek Temple

Reports of committees:

(a) On express and freight traffic facilities and costs.

(b) On merchandising transportation.

General business.

Reports of convention committees:

(a) On resolutions.

(b) On nominations.

Election of officers.

Installation of officers.

Adjournment.

PROGRAM OF CLAIMS ASSOCIATION

MONDAY, OCT. 11

9:30 a.m. to 12:30 p.m.

Registration and distribution of badges at registration booth.

2:30 to 4 p.m.

Meeting held in Claims Hall

Annual address of the president.

Annual report of the secretary-treasurer.

Report of the executive committee.

Appointment of convention committees:

(a) On nominations.

(b) On resolutions.

Reports of committees:

(a) On membership.

(b) On subjects.

(c) On safety.

(d) On ways and means.

(e) On statistics.

(f) On constitution and by-laws.

Joint meeting with Transportation & Traffic Association.

Report of committee on code of traffic principles.

Paper on "Automobile Hazards," by C. M. Talbert, commissioner streets and sewers of St. Louis and chairman of public safety section, National Safety Council.

TUESDAY, OCT. 12

2: 30 to 5 p.m.

Meeting held in Claims Hall

Paper on "Automobile Hazards," by Ralph Stickle, assistant superintendent accident department Cleveland (Ohio) Railway.

Written discussion prepared by L. H. Roche, general inspector associated bureaus Pittsburgh (Pa.) Railway; W. G. Fitzpatrick, general claims attorney Detroit (Mich.) United Railway, and J. H. Handlon, claim agent United Railroads of San Francisco, Cal.

WEDNESDAY, OCT. 13

2: 30 to 4: 30 p.m.

Meeting held in Claims Hall

Paper on "Accidents—Cause and Prevention," by F. E. Shumate, general attorney Atlanta Northern Railway, Atlanta, Ga.

Written discussion on "The Influence of Welfare Work," by R. N. Hemming, superintendent of transportation Fort Wayne & Northern Indiana Traction Company, Fort Wayne, Ind.

Written discussion on "Effect of Bonus System," name of speaker to be announced.

Written discussion on "Co-operation of Trainmen," by J. E. Duffy, general superintendent New York State Railways, Syracuse, N. Y.

Convention Entertainment

A fine entertainment program has been prepared under the direction of Martin Schreiber. Details will be given in a later issue.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Havana Has a Strike

Frank Steinhart, Ex-Soldier and Cosmopolite, Refuses to Pass Increased Wage Burden to Public

Frank Steinhart is again the talk of all Cuba and of those in the United States who are interested in affairs on the Island. He it was who made a success of the Havana Electric Railway and who later succeeded in bringing about the consolidation of the railway, light and power interests there as the Havana Electric Railway, Light & Power Company, of which he is now president.

OPPOSED TO FARE INCREASE

Mr. Steinhart has peculiar ideas about transportation service and peculiar ideas about fares and the burdens that labor should seek to impose on the public and on struggling enterprises. So when the motormen and conductors of the Havana company went on strike on Aug. 7, thinking that all the company had to do in order to meet an increase in wages was to advance fares to the public, Mr. Steinhart had a little surprise in store for them. He rejected their proposal. And in doing so he explained as follows:

> I am giving our employees all it is possible to give. The total wage increase granted them since Jan. 1 of this year has been $1,300,000. We cannot give more unless the fares are raised.
>
> However, I am opposed to an increased fare and will not accept one. I do not favor charging all of the public 1 or 2 cents a ride more to be turned over to a relatively few men and even partly into the company's coffers. I may be wrong in my ideas, but there must be an end to increasing wages and then increasing prices with the public bearing the burden. We must all strive to bring the cost of living down and I am willing to bear the brunt of making the start in this matter.
>
> In view of the prevalence of the jacking up of wages and then jacking up prices to a proportionate level it may seem that my ideas are wrong. But I have weighed this matter carefully and my action is based upon study of the situation. In the first place I have not seen any benefits from the practice of increases. The public pays in the rise in the cost of living.
>
> It might be well enough to raise the fares here to pay the increase the men demand, if that were the end. But it will not be the end. In January, for example, there may well be another demand for higher wages and that would mean raising the fares again. That can't go on forever and I am going to start fighting it right now.

Still the strike was on and not a wheel moved. The police arrested about thirty men as agitators. Two days after the strike started, the company began to put in effect a carefully worked out plan for restoring the service. New men were employed and these, together with inspectors and starters, took out cars under police protection. The company began to build up a new organization from the bottom. The new men were carefully picked; more were rejected than accepted. Fifty students who volunteered were rejected with the comment that this was not a "lark." The new men are said to have received less than the former employees.

The shop men went out in sympathy and then the taxi drivers. Mr. Steinhart held fast and increased his service. He uttered no word of denunciation of the strikers. The public backed him up. There was no excitement. Meanwhile the Government began deportation proceedings against fourteen Spaniards arrested in the strike. This started talk of a general strike. Mr. Steinhart did not alter his course. Finally a committee representing the associated unions called on Mr. Steinhart and asked him to intercede with the Government officials to halt the deportation proceedings because this would hamper efforts to settle the situation. Mr. Steinhart refused to "intercede," but agreed to convey the request to Secretary of Interior Charles Hernandez. The Secretary said he would put the cases over for one sailing. The next day the former employees began to apply for their old jobs. The railway strike was broken. The sympathy strikes collapsed.

P. R. T. Rejects Two Franchises

The Philadelphia Rapid Transit Company has rejected two franchises for the proposed Hunting Park-Erie Avenues and Roosevelt Boulevard extensions. The former was not accepted for the reason that the ordinance contained a specific provision for the completion of the project within twelve months from the date of approval, and provides for a bond in the sum of $50,000 conditional upon the carrying out of the terms of the ordinance. Since the company is not now able to build these tracks, and cannot build them until its financial position is bettered, it cannot contract to build them and give its bond for the faithful performance of that contract.

In the case of the Boulevard ordinance, the rejection was caused by the fact that the proposed line would not be expected to pay operating costs for several years. According to the ordinance, the city would have the right after ten years to order the company to remove its tracks and rebuild the line over an adjacent route. The salvage value of the tracks, if removed under the conditions of the ordinance, would barely pay the cost of restoration. These facts make the securing of money for this franchise impossible.

The company will accept the Sansom street, Twentieth to Twenty-second street ordinance, but will not be able to build these tracks until its financial condition has been bettered by the securing of additional revenue, for which application is now being made.

Work Going Ahead

Contracts for $1,711,570 of Construction Have Been Placed by Detroit Municipal Railway

The Detroit (Mich.) Municipal Street Railway is progressing with its track construction at various points. It has been announced by the Street Railway Commission that its working staff will lay the concrete foundations for the new lines at the rate of 1,200 ft. a day.

On the city's south line on Harper Avenue, where the Detroit United Railway owns the north track, the city tracks are down and the Department of Public Works is completing the final pavement. Bids have been asked for copper trolley wire sufficient for about 28 miles of track. Bids on supporting cable and a track welding machine are also asked and poles have been contracted for.

Although contracts for $1,711,570 worth of work and supplies have been awarded and bonds amounting to $1,750,000 have been authorized and sold, the track construction covered by existing contracts is only a small portion of the trackage proposed under the Mayor's municipal plan. No contracts have yet been let for the erection of carhouses or for the purchase of cars and other equipment.

RESIDENTS' PROTESTS UNHEEDED

On the advice of the Corporation Counsel the Street Railway Commission has declined to abandon its plan of constructing a part of the municipal system on Pennsylvania Avenue notwithstanding the protests of residents.

No final agreement has been reached by the city and the Detroit United Railway in regard to the construction of the proposed loop for turning Woodward Avenue cars at Elizabeth Street and Grand Circus Park. If a definite arrangement can be made, the Street Railway Commission will build the loop and rent it to the Detroit United Railway on a percentage basis of the cost of construction.

The session of the Street Railway Commission and officials of the Detroit United Railway held to discuss the track situation in the vicinity of St. Jean and Kercheval Avenues did not result in any definite agreement. It was decided, however, that a representative of the company would inspect the locality in company with a representative of the commission to see what could be done from an operating standpoint providing all other matters involved could be adjusted as between the commission and the company. The Detroit United Railway maintains it is necessary that these matters be first determined by agreement or in the courts.

Syracuse Survey Presented

$12,415,000 Fixed as Value of Lines—Ten-Cent Cash Fare Recommended—Service-at-Cost Considered

The value of the present property of the New York State Railways in Syracuse has been placed at $12,415,000 against $21,012,201 claimed by the corporation, and a 10-cent cash fare and a ticket fare of 7½ cents have been recommended under a service-at-cost plan by the Syracuse Street Railway Investigating Commission in its report to Mayor Harry H. Farmer. There are six findings and eighteen recommendations in the report. To bring the service in Syracuse to an adequate level, the report says, would require from $1,000,000 to $1,250,000. The return which the corporation is entitled to is fixed at 6 per cent and to improve the service the commission holds that the present system of fares and transfers and control of the lines must be radically altered. The report of the commission refers to and includes recommendations from a report and valuation submitted to it by the city's engineers, Ford, Bacon & Davis, New York. The report of the engineers covered valuation, at the figure recommended by the commission, new money requirements, recommendation as to the average fare, reduction of taxes, the use of one-man cars, rerouting plans and many details of traffic co-operation between company and city.

HIGHER toll charges are advocated for the suburban and interurban lines. The recommendation is made that the railroad be permitted to engage in package and express carrying business. It also is recommended that the company be permitted to operate buses as supplemental means of transportation. Consolidation of certain lines and abandonment of others proving unprofitable is urged and rerouting is suggested.

OPERATING ECONOMIES URGED

The skip-stop is advocated and the installation of a better sign system is recommended. Provision also is made in the recommendations for the purchase and operation on the Syracuse lines of one-man cars. The board would straighten the traffic in the congested down-town section and consolidate lines running in adjacent parallel streets.

Other recommendations made by the commission include that the regulation and control of service in the city should be through an advisory board of control and a street railway commissioner, subject to the jurisdiction of the Public Service Commission as provided by law; that the sprinkling tax now assessed as a cost of operation to the railway be abolished; that certain taxes and charges for maintenance and replacement of pavement now assessed against the railway be reduced; that a charge for transfers be permitted; that an extra charge for after-midnight service be permitted; that separate books of accounts and records of operation be kept in Syracuse, covering the Syracuse lines, and that the financial reports of the Syracuse lines be published at regular and frequent intervals.

EXTENSIONS BEING URGED

The company should make extensions and additions to trackage as soon as practicable, the report says, and it recommends that in the interest of speed, regularity of run and economy of operation fewer car stops be made; that the proposed Fairview carhouse, on which $50,000 already has been spent, be completed to provide ample carhouse facilities.

The proposed street railway commissioner would be named by Mayor Farmer and would be paid an annual salary of $10,000. The commissioner would be empowered to order capital additions, renewal and replacements, abandonment or replacement of property; routing or rerouting of cars; fix schedules, rate of speed, mode of operation, fix or approve car stops and direct generally everything that will improve service. All disputes are to be settled by arbitration. The commissioner would have power to employ accountants, engineers and other necessary assistants.

An annual budget of the railroad is made mandatory. The report says:

> On the first of December of each year the company is required to submit to the commissioner of street railways an estimate of its gross receipts and the cost of service for the ensuing calendar year. The budget of expenses must be itemized so as to show the amount expended for each expense involved in the cost of service, including operating, maintenance, taxes, amount of return to the company and all other expenses which the company and the commissioner of street railways agree shall be paid from the general fund provided in the agreement. No operating expenditures other than those specified in the budget can be made by the railroad company except with the approval of the commissioner of street railways. Any controversy between the commissioner and the company is to be settled by arbitration.
>
> ROCHESTER SERVICE-AT-COST PLAN FOLLOWED
>
> The agreement provides that there shall be deposited in an account to be known as the renewal and depreciation fund an amount equal to 2 per cent per annum of the capital value of the railroad property. The moneys in this fund shall be disbursed only for renewals and replacements as the commissioner of street railways shall direct, it being the intent that the cost of maintenance shall be paid as operating expense.
>
> It ought perhaps definitely to be made known that stocks, bonds or any securities issued by the company have had no part whatever in the valuation made by the experts and approved by he commission. The commission has not concerned itself as to those things, but only as to the property actually used and useful in the operation of the road.

The commission says that its proposed service-at-cost plan is modeled after that in effect in Rochester. The report adds:

> It is to be noted that the Rochester agreement makes the initial fare 7 cents with ten tickets for 65 cents, while our recommended agreement makes the initial fare 10 cents with six tickets for 45 cents.
>
> In comparing the initial fare in the two cities it must be borne in mind that the Rochester initial fare is based upon an estimated capital value so that the fare is likely to be changed as soon as the actual capital value has been determined. In Syracuse the initial fare has been based upon the actual capital value as found by Ford, Bacon & Davis, and the fare fixed in expectation of covering all the estimated obligations of the agreement for at least the first year, when it is hoped that increased patronage resulting from improved service will make the fare lower. Also Rochester is a larger city than Syracuse with many important conditions more favorable for low cost of street car service than Syracuse.

The committee which has reported was appointed by the Mayor some months ago. It was headed by Giles H. Stillwell. The company would of course continue to manage its own affairs, but would be guided by the Street Railway Commissioner, being subject to penalties if the orders of that official were not obeyed.

Hartford Mayor Appeals for Trolleys

Acting Mayor C. D. Allen of Hartford, Conn., has addressed to each member of the local Board of Aldermen a copy of a report dealing with the dispute between the Connecticut Company and the jitneys in Bridgeport. The report in question was presented to the Bridgeport Common Council by the local transportation committee. The question of bus regulation in Hartford will come before the Board of Aldermen of that city at its meeting on Sept. 27.

In calling the attention of the board members to the report, acting Mayor Allen said:

> I feel very sure that the enclosed report of the trolley-jitney committee of Bridgeport will be of much interest to you. There are several vital points brought out, as follows:
>
> The unfairness of competition, the trolley company being obliged to maintain right of way, pay portion of cost of bridges and pay a percentage of gross receipts to the city.
>
> Which method of transportation can serve Hartford best in winter?
>
> I would call your attention to the congestion of streets with trolleys, which has got to be relieved. There is a necessity that the jitneys combine so that the city may deal with one or more responsible parties or corporations rather than with any individual bus or jitney driver.
>
> The city would be saved money by the use of the trolley lines for carrying freight and express. This question not only affects the city but the surrounding towns which make Hartford their buying center.

Jolt for H. C. L. at Los Angeles

Arrangements have been made by the Los Angeles (Cal.) Railway whereby employees may share in purchasing a carload of government food supplies at reduced prices. The company explained that while it would be impossible to quote exact prices until the goods arrived and the freight and incidental expense could be determined, the maximum price of the bacon would be $2.90 per 12-lb. can, 19 cents per pound can for the roast beef and approximately 25 cents per pound for the corned beef, with corresponding prices for other products.

The Los Angeles Railway is financing the purchase of the supplies, which will involve about $7,000.

$12,000,000 for Improvements

Work Now Being Carried Out in Milwaukee Will Total That Amount —Separate Power Company

Announcement has been made of the incorporation of the Milwaukee Power Company. This company has been formed to finance a new $6,000,000 power plant now under construction at St. Francis, a suburb of Milwaukee, for the Milwaukee Electric Railway & Light Company.

SEPARATE COMPANY FOR POWER DEVELOPMENT

John I. Beggs, president of the Milwaukee Electric Railway & Light Company, is reported by the press as having stated that the formation of the new company was forced by the inability to obtain money to complete the plant, because bankers would make no loans upon secondary mortgages. The new corporation, which will have a nominal capitalization of $1,000,000, was not formed for profit.

The power plant as thus far completed is to be sold to the new company for what has been expended on it by the Milwaukee Electric Railway & Light Company. Power produced by the new power plant will probably be sold to the Milwaukee Electric Railway & Light Company under contract. The new company will issue bonds with the power plant as security.

Mr. Beggs is further reported to have said that the Milwaukee Electric Railway & Light Company contemplates expending approximately $12,000,000 on new projects. Of this amount half will be used for the power plant mentioned above, $1,500,000 for transmission lines to the various substations, $1,500,000 for new distribution lines and $3,000,000 for new cars.

PRESENT FACILITIES TAXED TO LIMIT

According to the reported statement of Mr. Beggs, the present power facilities of the Milwaukee Electric Railway & Light Company are being taxed to the limit. Equipment is being overloaded as much as 50 per cent at times and when poor coal is encountered it is with the greatest difficulty that the load is carried.

Lakeside, as the new power plant is known, it is claimed, will be one of the most modern electric plants in the country and one of the largest. It will use pulverized fuel and is thus expected to achieve marked economies. The first unit is expected to be completed in the fall of this year. It will add 40 per cent to the available supply of electrical energy of Milwaukee.

Utility Board Defended

During the first day's defense of the Board of Public Utility Commissioners of New Jersey, the official acts of which are being investigated by Governor Edwards at the instance of the municipal authorities of Jersey City, L. Edward Herrmann, counsel for the board, contended that in the performance of its duties the board had uniformly followed the state courts' rulings.

George L. Record, counsel for Jersey City, mentioned as his "basic and fundamental charge" that the Utilities Board does not represent the public, but "has deliberately taken the part of the corporations." The board, he said, has turned itself into a court instead of acting in its legal capacity as an administrative body.

One of the bulwarks of our system of government, said Mr. Herrmann at the conclusion of Mr. Record's comprehensive opening, has been that the courts shall pass upon the relative rights of parties to controversies. If regulation has failed it has done so because of abnormal conditions, not through any fault of the board. According to Mr. Herrmann we are passing through an era of unrest throughout the world, with dissatisfaction centering upon regulatory bodies. He said that any one who feels aggrieved over the board's acts, whether of omission or commission, should quarrel with the courts and not with the board. Mr. Herrmann further pointed out that the very statute under which the board functions provides for a review of its acts by the Supreme Court at the instance of any person or group who may have cause to complain.

$3,500,000 for Improvements in Pasadena

H. B. Titcomb, vice-president of the Pacific Electric Railway, Los Angeles, Cal., on Sept. 17, announced plans calling for an expenditure of approximately $3,500,000 for improvements covering virtually the entire northern division of the Pacific Electric Railway. The improvements contemplated include the transformation of the Southern Pacific Station at Colorado Street and Broadway, Pasadena, into a joint terminal for the use of both steam and electric lines, a tunnel under Raymond Hill in order to shorten the distance between Los Angeles and Pasadena, and changes that will affect the service between Los Angeles and Alhambra, San Gabriel, Azusa, Glendora, Arcadia and other Northern Division points. At present the Pacific Electric Railway has no terminal in Pasadena.

With reference to the tunnel, it is proposed to construct a bore from Fair Oaks Avenue to Broadway through which all interurban trains will pass, running up Broadway to the new terminal. If the building of the tunnel is not feasible a new line will be constructed on Glenarm Street or south of that street to connect with Broadway.

The general situation with respect to the operation of the Pacific Electric Railway in Pasadena and the tentative plans for the new work to be carried out there were described by Edward Hungerford in his article "California and Her Tractions" in the ELECTRIC RAILWAY JOURNAL for Sept. 11, page 490.

Property Owners Objecting

Residents of Highly Restricted Detroit District Protest Municipal Railway Construction

A suit which was anticipated following the delivery of an opinion by the Corporation Counsel to the Council of Detroit, Mich., to the effect that the Council had no power to change the routing of the municipal lines to streets other than those set forth in the ordinance, passed on April 5, has been filed in the Wayne County Circuit Court by 110 residents of Clairmount Avenue. The petition asks for an order to show cause why an injunction should not be issued restraining the city from building the Clairmount-Owen-Holbrook line.

BASIS OF COMPLAINT STATED

Among the points made in the complaint are that the ordinance passed on April 5 differs from the Mayor's statements relative to the plan for the proposed railway; that the ordinance is defective as to route in that it authorizes the building of a line through Hamtramck, a village which is entirely surrounded by the city of Detroit, without the consent of the residents of the village, and also that it authorizes the taking over of the Linwood Avenue line without providing for the purchase of that line from the Detroit United Railway. It is also contended that contracts made by the Street Railway Commission for material for use in the construction of the lines are defective.

Work has been started on another section of the municipal lines, the Charlevoix-Buchanan crosstown route. This will be the first line to be constructed on the west side of the city.

Through its publicity department the Detroit United Railway has summarized the results of the five months' effort on the part of the city to construct the municipal lines. The statement is made that none of the track work with paving is actually completed and none of the overhead system installed, so that the cars even if they were purchased and delivered could not be operated.

ULTIMATUM TO D. U. R.

The city's ultimatum to the Detroit United Railway to vacate St. Jean Avenue with its tracks and use instead the double tracks to be built by the city on that street will be answered soon by the company, it is expected. When the company was ordered to remove its track on St. Jean Avenue, it refused to comply on the claim that it was granted permission to build the line by the City Council in 1914. This track is used by the company for Y-purposes. The Street Railway Commission has informed the Detroit United Railway that it intends to go ahead with its double track on St. Jean as part of the municipal system, and that the company will be allowed to use the city tracks for Y-purposes if it desires to do so.

Einstein Theory and Strikes

Need Seen for Application of the Doctrine of Relativity to Life in Labor Disputes

Professional papers as well as the daily press have given attention to the Brooklyn strike. Among the interesting comments on the situation in Brooklyn and on collective bargaining in general is the following editorial from *Chemical & Metallurgical Engineering* for Sept. 15. It is entitled "A Little Homily on the Brooklyn Strike" and reads as follows:

> As these lines are written the Borough of Brooklyn is tied up tight on account of a strike of the street railway employees. They were under agreement not to strike—and the Mayor of New York went to their meeting and took from them a pledge to withhold all action until he should have had a conference with their employers. His Honor is a comedy character whose ambition seems to be to make the laborin' man feel sure that the Mayor is with him, right or wrong, no matter what he does—as long as he belongs to some union. Unless he has a big organization with many thousand votes behind him he is not a laborin' man—down at City Hall.
>
> CHAOS AND BRICKBATS
>
> At 2 o'clock a.m. when the night gang left work they had another meeting of their own, and they voted to strike, despite the previous resolution at the general meeting, because somebody is said to have said, which it is admitted was not true, that a number of men had been discharged. Then those who voted against the measure at the general meeting followed the strikers out. Now chaos reigns and brickbats fly.
>
> This speed on the trigger, this German military principle of smashing up everything and making the results as *schrecklich* as possible in order to give emphasis to an opinion, is both expensive and, in the long run, bound to be unprofitable. Now to be a street-car conductor is to engage in a respectable and honorable calling. The intellectual demands may be slight, but some of us do not respond successfully to intellectual demands, and it is well for the world that there are plenty of jobs that do not require the burden of thought. But a respectable and honorable calling does not warrant either one man or a thousand of them to throw a million people into misery and to rob them of their chance to gain a living. Surely the world is neither so stupid nor so bad as to make it necessary to paralyze a whole community every time a number of persons engaged in similar employment want something.
>
> COMPULSION INHIBITS BARGAINING
>
> What we need is the application of the doctrine of relativity to life. Relativity teaches us first to consider the dimensions of ideas, and then to compute the effect of their application. That is Einstein's procedure, and it is a very good one. We talk of collective bargaining, and most of us are disposed to favor the abstract idea, but isn't it time we began to think of what we mean by collective bargaining? What is bargaining? It means to negotiate beforehand; to trade. Its dimensions which we must study, in order to understand the effects of bargaining, are service, or goods, and money. Bargaining means bargaining whether done by two persons or by many. Force or compulsion does not enter into it, because as soon as it does bargaining ceases.
>
> If A has a house and B wants to buy it they may bargain to reach an agreement and sale, but if B knocks A on the head and threatens to keep it up until he wants to pay we cannot call it a bargain. A strike is not a part of collective bargaining; it is compulsion, and compusion inhibits bargaining. Discharging one man or locking out a thousand is not bargaining, either. It is also compulsion.
>
> We are in favor of rapid and effective punishment of the employer who exploits labor; who tricks the men that work for him, or even who does not recognize his great obligations to those who cast their lots with him and throw their lives and fortunes into his enterprise. We believe that every employer is in bondage to his obligations and that the man who is unfair to those who work under him should be deprived of the privilege of administering affairs that involve the employment of men and women. But we are equally convinced that the man who works with his hands by the day is also in bondage to his obligations. And if many of them form a union the union also has obligations, not only toward its members but to the general welfare. The doctrine of relativity applies here too, but we forget it in practice, and so, often, do the strike leaders. Just because we sport a union card is no reason why we should think we have privileges which are denied to others. Neither this nor the election to executive office by a board of directors will release us from our obligations.
>
> MORE QUANTITATIVE THINKING
>
> Relativity teaches us this, and it is very sound philosophy. We need more of it; and more quantitative thinking. Whenever the Rule of Wrath begins we lose our count, and then there is the devil to pay. Should we not profit by the example of Germany?

Amalgamated Rejects Arbitration Award

Motormen and conductors of the United Railways, St. Louis, Mo., have voted to refuse to be bound by the decision of the Missouri Public Service Commission against reopening the wage question. A letter has been mailed to the commission informing it officially that the commission's decision would not be recognized by the men. This letter is quoted as follows:

> We are in receipt of your notice of Sept. 4 of the action of the Public Service Commission in the case No. 3527 of Sept. 3. I am instructed by the members of Division No. 788 of the Amalgamated Association that we do not recognize the award as binding and just, inasmuch as the decision was arrived at, not by considering the evidence that was submitted in the case in compliance with the submission jointly signed by the receiver for the United Railways and the committee representing Division No. 788, but was based wholly on the fact that to have granted an increase to the members of Division No. 788 would mean an increase in tariff.
>
> The submission signed jointly by the receiver and the committee representing Division No. 788 was for the purpose of an adjustment of the wage disagreement fairly on the evidence in the case and was in no way contingent on the question of tariff.

Col. Albert T. Perkins, manager for the receiver for the United Railways, asserted that the company has no choice under orders of the federal court but to accept the decision of the arbitration board.

Wage and Fare Increases Recommended

The long-awaited report of the three masters in chancery on the problems of the New Orleans Railway & Light Company, New Orleans, La., has been presented in New Orleans by Judge Foster's appointees. It recommends raising wages of all trainmen, revalues the property at $41,500,000, recognizes the union and recommends an 8-cent fare instead of the present 6-cent fare but with tickets at 7 cents. The wage increase is less than the men asked when they went on strike in July. It represents an average of nearly 30 per cent. The rehabilitation of the lines and service are among the aims. The increase is retroactive to July 1. The increase in fares is subject to the approval of the City Commission of New Orleans. The report of the masters must have the approval of the judge. The masters began their inquiry several weeks ago, immediately after the men returned to work after a strike of almost a month.

Hydro-Radial Policy Stated

Canadian Premier Explains Government's Attitude on Hydro-Radial Railways in Ontario

At the annual meeting of the Ontario Municipal Association held in Toronto on Sept. 3 Premier E. C. Drury outlined the position of the Ontario Government with respect to the proposed construction of hydro-radial railways by the Ontario Hydro-Power Commission on behalf of the municipalities and the action taken by his government in halting further expenditure until the special commission under the chairmanship of Justice Sutherland has investigated the whole Hydro undertaking and made its report.

DELAY CAUSES CRITICISM

Premier Drury said that the action of the government in holding up the hydro-radials pending an inquiry had caused much criticism. The inquiry was without bias to determine what was best to be done. The Premier said:

> Hydro-radials is not a hydro-electric development. It is a very different thing for a municipality to launch into the owning of expensive railways. The inquiry into one question does not mean we will not support the other. But the launching of the Government and municipalities into hydro-radials is a different thing. It has nothing to do with hydro development or distribution of power. We don't hold with the policy of saying that because the people have voted, we should go ahead. Ultimately the Government will have to support it.
>
> I am not saying the hydro-radials will be unprofitable. We are just investigating it, like any business man would do.
>
> This commission is investigating the hydro-radials. I said once in a joke they were mediocrities. This was used by one newspaper to hurt the Government. They are not mediocrities, but the best men we could get.
>
> If the report of the commission is that the policy is sound, we can finance it in much better shape. If the policy is not sound we shall expect the municipalities and the Hydro-Electric Commission to accept the reasonable conclusions as final in the matter.
>
> There have been two changes since the hydro-radials were considered. The Dominion Government has taken over the Canadian Northern Railway and Grand Trunk Railway. These were bankrupt roads. The trouble is we have too many railroads. The two lame ducks have been taken into the fold and the Government is trying to run them. We are finding ourselves with increased freight and passenger rates because of too many roads.
>
> When hydro-radials were brought forward it was said that competition would help us. Now we would only be competing against ourselves. Another reason for the inquiry is that ultimately the Government will be responsible for the money if necessary.
>
> AUTO AS A FREIGHT HANDLER
>
> The third reason is that we are entering upon a period of road development, which is important to the rural sections and to the cities. This policy was necessitated by the change of transportation. As the auto has displaced the horse in a large degree, so motor trucks have displaced the railway for handling freight. That is the reason for good roads policy. The money spent on that will give better results than money spent on railways.
>
> This does not mean that we won't use electricity for freight and passenger service. The province can sell the electricity developed to the railways to electrify their roads. This whole matter has led us to say, "We want to be shown."
>
> We are not making any accusations against any one. And I don't think that Sir Adam Beck is objecting greatly to the investigation, or that there is much objection from that quarter. We are not opposed to hydro-electric development, but we have reasonable doubts about the advisability of going ahead with hydro-radials till we have looked into the matter a little further.

Denver Service Normal

Service is now practically normal on the lines of the Denver (Col.) Tramway. The company has recruited a full force of trainmen to take the places of the strikers, and has stopped hiring new men. G. Y. Harry, federal mediator, has left the city. Mr. Harry went to Denver several weeks ago, shortly after the calling of the walkout, to try to effect a settlement.

The members of the executive committee of the union, who had been sent to jail for contempt of court, were released on bail of $1,500 each on Sept. 18. Sporadic attacks on car operators by former employees of the company continue. The motorman and the conductor on a car of the Fairmont line were beaten and robbed by strikers at midnight on Sept. 18. After locking the men in the car vestibule and starting the car, the thugs made their escape. The car struck a switch half a mile further on and was derailed but was not overturned. Another attack was made on an "owl" car on Sept. 20, but no one was seriously injured.

News Notes

Strike Ends at Nashville.—The striking carmen of the Nashville (Tenn.) Traction Company returned to work on Sept. 23. The men walked out on Aug. 22, tieing up service throughout the company's system. The company restored partial service with aid of strike breakers. During the course of the strike one person was killed while riding on one of the company's cars.

One-Man Cars Win.—The employees of the Eastern Pennsylvania Railway, Pottsville, Pa., went on strike on Sept. 17 in consequence of a dispute over the operation of one-man cars, recently acquired. When the men reported for duty on Sept. 17 they refused to operate the cars. The officials of the company met this opposition without any signs of compromise. For five days the system centering in Pottsville and running through many towns in the coal region of Schuylkill County was tied up.

Wage Dispute Will Go to Arbitration.—Agreeable to the officials of the Boston & Worcester Street Railway, Boston, Mass., and the employees, the matter of the wage dispute is to be left to a board of arbitrators. Guy W. Cox, Boston, will represent the company, and James H. Vahey, Boston, will represent the men. The wage increase when granted will probably be retroactive to Sept. 1. The men asked for an increase in wages from 52 cents an hour to 95 cents, and a working day of eight hours in ten instead of nine hours in eleven.

Purchase Proposal Before Voters.—At the next election the voters of San Francisco, Cal., will have two amendments submitted for their approval. The first, in the form of a proposed charter amendment, will be the question of the city's acquiring the property of the United Railways under the "pay as you go" plan. The second of these provides for an increase of the interest rate on the city bonds. This course was determined on after a conference held in the office of the Mayor on Sept. 7. The proposals will be prepared at once by City Attorney George Lull and Attorney Robert M. Searles.

City Would Revoke Franchise.—City Counsel Charles E. Bird plans to apply to Attorney-General Thomas F. McCran for authority to bring a suit in the name of the State to require the New Jersey & Pennsylvania Traction Company, Trenton, N. J., to show cause why its franchise in the city of Trenton should not be revoked for violation of the franchise contract. The application grew out of the refusal of the company to arbitrate the recent differences with its employees over wages and other matters. It is contended that in the franchise of the company there is a paragraph which binds it to submit differences with its labor to arbitration.

Advance for Stockton Men. — The Stockton (Cal.) Electric Railway has announced increases in the salaries of all employees. Advances range from $12 a month for new platform men to $16 a month for men who have seniority with the company. Other motormen and conductors will receive an increase of $14 a month. New men who have been receiving 45 cents an hour will now receive 51 cents. Second-year men are paid 52 cents, third-year men 53 cents, while fourth-year men receive a monthly bonus of $5. All motormen and conductors who have been in the employ of the company for one year or more are allowed twelve days' vacation on pay.

Men Told to Arbitrate.—A committee representing the employees of the Grand Rapids (Mich.) Railway appeared before the City Commission on Sept. 2 to seek help in settling their wage demand. The commission was in favor of arbitration in view of the contract of the men which stated that wage controversies should be settled by arbitration. The committee was headed by R. L. Reeves. The members told the commission that if a rise in fare were authorized the company could undoubtedly meet the increased wage demands of the men. Commissioner Emery suggested a referendum at the November election if an agreement could not be reached between the men and company before that date.

Purchase of Road Urged by Council.—The Town Council of Port Colborne, Ont., has adopted a resolution urging the Hydro Commission to take over the Niagara, St. Catharines & Toronto Railway on these terms: That the commission assume the obligations stated to be outstanding against the company; that a bond of undertaking of the Hydro Electric Power Commission be given to the government in payment of the proposed purchase price and that this should constitute a first mortgage charge upon the railway; that the commission shall on behalf of the municipalities enter into priority agreements for the interchange of traffic between the railway and the Canadian National Railway.

Employees Ask Mayor's Aid.—A delegation of the Co-operative Welfare Association of the Louisville (Ky.) Railway, composed of employees of the various departments called upon Mayor Smith on Sept. 15 with a request to use his influence toward securing an increased fare for the company. The company is desirous of granting an increase in wages to its men, but the men themselves know that this is impossible with the present fare rate. J. P. Barnes, president of the railway, has announced a plan involving the purchase of fifty cars, the consolidation of power plants and an increase in wages for employees, dependent upon an advance in fares. It would require $60,000 a year to pay 1 cent an hour more to the 1,600 employees of the company.

Threat of Strike in London.—Dissatisfied over the payment of a bonus of 1 cent an hour on their wages for the month of July, trainmen employed on the London (Ont.) Street Railway threaten to strike. The bonus is the dividend from the $600 surplus the railway and municipal board is able to show on the business for July. The men only recently called off a strike when the company promised to give them a bonus based on the surplus each month. The employees were to receive 48 cents an hour and a division of the surplus remaining after operating costs and bond interest had been paid. The municipal board insists it also included redemption, and this the men dispute. If the board agrees to forego bond redemption the men claim their wages would be about 52 cents an hour.

Five Cents More for Wilmington Men.—The trainmen of the Wilmington & Philadelphia Traction Company, Wilmington, Del., have accepted the offer of the company of a wage increase of 5 cents an hour retroactive to Sept. 5. The new scale brings the rate to 56 cents an hour for the first three months' service, 58 cents for the next nine months and 60 cents for one year's service and thereafter. Thomas W. Wilson, vice-president of the company, says that a wage advance of 10 cents an hour was granted the trainmen a year ago at which time the company filed a petition with the Public Utility Commission for a fare increase. This was refused until a few weeks ago. However, during all this time the company has been paying the advance wage to the men without any increased revenue. Consequently a deficit of $95,000 now remains. He exhorted the trainmen to work in co-operation with the company in order to maintain efficiency of operation.

Financial and Corporate

Another San Francisco Plan

Nearly All Creditors Have Agreed to Reorganization Proposal Now Before California Commission

For the third time in four years a plan has been presented to the Railroad Commission of California for the reorganization of the United Railroads, San Francisco, Cal. The latest plan has the approval of 97 per cent of the creditors. Under it the present capitalization and bond issues of the United Railroads would be cut down from $81,945,600 to $47,516,000 and the Market Street Railway would acquire all properties now owned by the United Railroads. The plan was put before the State Railroad Commission on Sept. 10, in the form of an application for authorization to issue stock, bonds and notes, and to take proceedings pursuant to such reorganization plan.

OBLIGATIONS REDUCED

Contemplated reduction of obligations through means provided by the reorganization plan will mean a lessening in interest charges of from $1,685,650 to $843,000 a year. Mr. Von Phul, president of the company, explained that duplication of the plant would cost approximately $60,000,000 at this time and actual appraisal by engineers of the company places its present value at $52,210,195. Separate appraisal by engineers of the State Railroad Commission fixes the present value at $37,237,211.

The company, through lack of revenue, has defaulted in interest payments since Oct. 1, 1916 Negotiations looking toward possible purchase of the system by the municipality have been going on for more than three years.

Advocates of the reorganization plan told the commission that none of the other creditors of the United Railroads would be adversely affected by the proposed plan, because it contemplates that the new organization will assume current liabilities and obligations of the United Railroads.

FIXED CHARGES REDUCED

Under the proposed plan the Market Street Railway, which now has an authorized capital stock of $18,750,000, all of which is owned by the United Railroads, will be recapitalized, so that it will have an authorized capital of $32,150,000, divided into four classes of stock, and the Market Street Railway will issue $5,200,000 of notes, which will be secured by $5,200,000 of Market Street Railway bonds and the properties of the Sutter Street Railway, Sutro Railroad and San Mateo lines. It also will issue $3,525,000 of Market Street Railway bonds, all in exchange for the properties of the United Railroads.

In presenting the matter to the commission, officials of the company contended that the proposed new capitalization and bond and note issues of the Market Street Railway, aggregating $47,516,000, will be justified by the reproduction cost, less depreciation, of the properties of the United Railroads as they now stand, excluding all amounts for going value, franchises or intangible values of that nature. The aggregate amount of the proposed bond and stock issues, it was asserted, is also less than the cost value of the property, plus the amounts since put into the property.

P. R. T. Net Income Approaching Deficit

The Philadelphia Rapid Transit Company has a large decrease in its net income both for August and for the eight months ended Aug. 31. In August, 1919, the net income was $53,523, while for 1920 it became a deficit of $112,854. For the eight months the decrease was 59 per cent. A deficit has not been encountered as yet in the income statement beginning Jan. 1, but unless steps are immediately taken looking toward relief for the company in the shape of a fare change of some kind a deficit is apparently not far off.

PHILADELPHIA RAPID TRANSIT COMPANY INCOME ACCOUNT

Month of August	1920	1919
Operating revenue	$2,999,199	$2,916,816
Operation and taxes	2,348,570	2,093,034
Operating income	$650,628	$823,782
Non-operating income	55,252	43,462
Gross income	$705,881	$867,244
Fixed charges	818,735	813,721
Net income	*$112,854	$53,523
Deferred wage adjustment—one month	$187,500	
5% return on P.R.T. paid in capital—one month	125,000	
Amount by which gross revenues are insufficient to provide for operating expenses, taxes, fixed charges, and the 5% return upon P.R.T. stock	$425,354	
Eight Months Ended August 31	1920	1919
Operating revenue	$24,760,738	$22,964,499
Operation and taxes	18,175,498	15,833,330
Operating income	$6,585,239	$7,131,169
Non-operating income	361,602	354,089
Gross income	$6,946,841	$7,485,258
Fixed charges	6,535,970	6,483,664
Net income	$410,871	$1,001,594
Deferred wage adjustment—three months	562,500	
5% return on P.R.T. paid in capital—eight months	1,000,000	
Amount by which gross revenues are insufficient to provide for operating expenses, taxes, fixed charges, and the 5% return upon P.R.T. stock	$1,151,628	

* Deficit.

Dominion to Wait

Will Not at Present Accept Hydro Bonds of Municipalities for Purchase of Electric Railways

Some time ago it was announced that Sir Adam Beck was negotiating with the Dominion Government for the purchase by him on behalf of the Ontario Hydro Commission acting in the interest of Ontario municipalities of the holdings of the Dominion Government in the Toronto Suburban Railway, the Niagara, St. Catharines & Toronto Railway and the Toronto Eastern Railway, which were acquired by the Federal Government when it took over the lines of the Canadian Northern Railway system.

ALTERNATIVE PROPOSAL MADE

When the Ontario (Drury) Government announced its policy of having an independent inquiry by a commission into the economic feasibility of the hydro-radial projects in Ontario before guaranteeing bonds for the construction of these lines, proposals were made to the Dominion Government to accept hydro bonds of the municipalities without provincial guarantees in payment for the three electric roads.

The proposal met with some encouragement at the start and there was a prospect that it might be acceded to. The question was deferred until the return of J. D. Reid, Minister of Railways, from Europe. It is now suggested that the hydro proposition be allowed to remain in abeyance. It is stated that nothing will be done in the matter till the commission investigating the radial project shall have made its report. The appointment of this commission was mentioned in the ELECTRIC RAILWAY JOURNAL for July 24, page 197. It is composed of Justice Sutherland, T. A. Russell, Fred Bancroft, W. A. Amos and A. F. McCallum. The sittings of this commission are all public. The chairman is Justice Sutherland.

The opinion is expressed that an awkward situation might arise if the Dominion Government should accept municipal bonds over the head of the Province, which has the power to define, enlarge or restrict municipal borrowing powers. It is very doubtful, therefore, if the electric lines of the Canadian National system will pass to the Hydro Commission unless the condition is such as will meet with the approval of the Dominion and Provincial governments and the directorate of the Canadian National Railways, who are understood to have considerable influence in connection with the proposal.

PURCHASE PRICE $7,000,000

Nearly $7,000,000 is the purchase price quoted by the Federal Government for the sale of the three electric roads—$2,628,000 for the Toronto Suburban, $3,544,000 for the Niagara, St. Catharines & Toronto, and $708,000 for the Toronto & Eastern lines.

Big Reduction in Interborough Deficit

In Spite of Enormous Increase in Traffic on Subway Lines, Net Corporate Income Shows a Deficit of More Than $2,000,000

The annual report of the Interborough Rapid Transit Company, New York, N. Y., for the year ended June 30, 1920, shows a deficit after taxes and charges of $2,235,835, as compared with a deficit of $3,810,340 in the preceding year. The aggregate number of passengers carried on subway and elevated lines was 955,133,110, against 809,335,658 in 1919. The report places great emphasis upon the need of New York City for more subways. The present trunk lines have about reached the limit of their capacity and conditions will become almost unbearable before new lines can be completed, even if construction were to begin immediately. The 5-cent fare is inadequate, as the annual deficit shows.

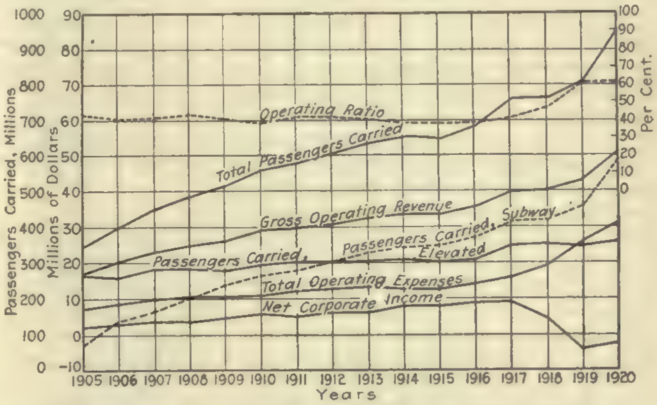
GROSS operating revenue for the year ended June 30, 1920, was $51,478,411, an increase over 1919 of $8,271,201, or 19.2 per cent. This result was caused by a gain of $6,990,765 or 28.4 per cent on the subway division, and a gain on the Manhattan railway division of $1,280,436 or 6.9 per cent. Operating expenses were $31,695,209, as compared with $26,233,326 last year, an increase of $5,461,883 or 20.8 per cent, of which $3,783,588 was on the subway division. This was caused by an increase of 3,755,213 car-miles operated, an increase of 2 per cent in the number of miles of road operated at the close of the year, and the continued tendency to increased cost of labor, coal, and other supplies.

The net operating revenue was $19,783,202, an increase of $2,809,318 or 16.6 per cent, the result of a gain on the subway division of $3,207,177 or 31.3 per cent and a loss on the Manhattan Railway division of $397,858 or 5.9 per cent.

The number of passengers carried was 955,133,110, compared with 809,335,658 in 1919, an increase of 145,797,452, or 18 per cent. This was the result of a gain on the subway division of 124,951,575 or 27.1 per cent and a gain on the Manhattan Railway division of 20,845,877 or 6 per cent. The gain on the subway division was the result of an increase of 79,840,319 in passengers carried over the lines constructed and equipped under Contract No. 3 and an increase of 45,111,256 in the traffic over the old subway lines.

During the year $7,619,911 was spent for maintaining the structure, roadway, power houses, electrical equipment and rolling stock, including strengthening of the elevated structure.

The net expenditures during the year amounted to $5,295,014, including the company's contribution toward new extensions, also the completion of miscellaneous work under way last year. Improvements on the subway included the installation of remote control circuit breakers, and the relocation of section breaks. There were put into service 7.78 miles of new a.c. cables and 2.11 miles of new d.c. cables. On the Manhattan they included the installation of interlocking plants, and signals connected therewith on local and express tracks, block signal system on express tracks, and signaling on local track curves on Second, Third and Ninth Avenue lines of the elevated.



COMBINATION CHART COVERING FIFTEEN YEARS

The operations of the last fiscal year demonstrate that even the subway itself, with all its congestion, cannot, on

INCOME STATEMENT* INTERBOROUGH RAPID TRANSIT COMPANY

Year Ended June 30	1920 Manhattan Railway Division	1920 Subway Division	1920 Total	1919 Manhattan Railway Division	1919 Subway Division	1919 Total	Total Percentage Change
Revenue from transportation	$18,469,433	$29,309,893	$47,779,326	$17,422,288	$23,052,286	$40,474,574	+18.1
Other street railway operating revenue	1,386,005	2,313,080	3,699,085	1,152,714	1,579,922	2,732,636	+35.4
Gross operating revenue	$19,855,438	$31,622,973	$51,478,411	$18,575,002	$24,632,208	$43,207,210	+19.2
Operating expenses:							
Maintenance of way and structure	1,250,892	2,150,362	3,401,254	1,159,024	1,499,086	2,658,110	+28.0
Maintenance of equipment	1,528,869	3,225,543	4,754,412	1,441,476	2,317,639	3,759,115	+26.4
Traffic	241	860	1,101	2,683	934	3,617	—69.5
Transportation expenses	9,777,378	11,512,603	21,289,981	8,323,457	9,527,755	17,851,212	+19.2
General expenses	976,342	1,272,119	2,248,461	928,788	1,032,485	1,961,273	+14.6
Total operating expenses	$13,533,722	$18,161,487	$31,695,209	$11,855,428	$14,377,899	$26,233,327	+20.8
Net operating revenue	$6,321,716	$13,461,486	$19,783,202	$6,719,574	$10,254,309	$16,973,833	+16.6
Taxes assignable to railway operations	2,186,645	436,765	2,623,410	2,251,981	882,175	3,134,156	—16.3
Operating income	$4,135,071	$13,024,721	$17,159,792	$4,467,593	$9,372,134	$13,839,727	+24.0
Non-operating income	73,523	534,846	608,369	112,358	494,944	607,302	+ 0.2
Gross income	$4,208,594	$13,559,567	$17,768,161	$4,579,951	$9,867,078	$14,447,028	+23.0
Income deductions	9,075,383	10,928,613	20,003,996	8,682,662	9,574,706	18,257,368	+ 9.6
Net corporate income	*$4,866,789	$2,630,954	*$2,235,835	*$4,102,771	$292,372	*$3,810,340	+41.3
Dividends	....	....	....	....	....	1,750,000	.....
Net income	*$4,866,789	$2,630,954	*$2,235,835	*$4,102,771	$292,372	*$5,560,340	+60.0
Accruals under Contract No. 3 and related certificates	$7,088,164	$1,145,396	$8,233,560	$5,895,025	$1,605,046	$7,500,071	+ 9.8

* Deficit.

STATISTICAL INFORMATION INTERBOROUGH RAPID TRANSIT COMPANY

Year Ended June 30	1920 Manhattan Railway Division	1920 Subway Division	1920 Total	1919 Manhattan Railway Division	1919 Subway Division	1919 Total	Total Percentage Change
Miles of road	40.14	62.59	102.73	40.14	60.58	100.72	2.0
Miles of single track	135.18	201.26	336.44	135.29	195.13	330.42	1.8
Total passengers carried	369,034,477	586,098,633	955,133,110	348,188,600	461,147,058	809,335,658	18.0
Daily average passengers carried	1,008,291	1,601,362	2,609,653	953,941	1,263,417	2,217,358	17.7
Per cent expenses to earnings, excluding taxes	68.16	57.43	61.57	63.82	58.37	60.71	1.4
Per cent expenses to earnings, including taxes	79.17	58.81	66.66	75.95	61.95	67.97	1.9
Passenger revenue per mile of road	$461,500	$468,000	$465,000	$435,000	$381,000	$402,000	15.7
Passenger revenue per mile of single track	$136,500	$145,600	$142,000	$128,800	$118,000	$122,300	16.1
Passenger cars (motor and trailer)	2,213	1,816	4,029	2,217	1,806	4,023	....
Service cars	60	57	117	60	57	117	....
Total all cars	2,273	1,873	4,146	2,277	1,863	4,140	....

a 5-cent fare, earn the interest and sinking fund on the bonds and notes issued for its construction and equipment. While the net corporate income during the past year was $2,630,954 in excess of fixed charges, it would have to be more than double this amount to pay interest and sinking fund on other moneys invested, including approximately $100,000,000 by the city. The latter's debt for new subways amounts to between $200,000,000 and $250,000,000 and is constantly increasing.

The average yearly increase in passengers carried in the subway since 1905 is 16.4 per cent. The year previous to the opening of the present extensions constituting the "H" system the subway carried 418,337,666 passengers. For the following year 1919 it carried 461,147,058, an increase of 42,809,392 or 10.2 per cent, and during the past year 586,098,633, or an increase of 27.1 per cent. By taking the average yearly increase, if construction of new lines were inaugurated immediately, during the intervening period, estimated at four years, before operation of new lines could be commenced, there would be added to the number now carried each year 489,088,652 passengers, almost doubling the present number in the four-year period.

Frank Hedley, president and general manager of the Interborough, in commenting upon the future of the company, discussed the possible conditions if the Interborough went into the hands of a receiver. He said that if a receivership was followed by the cancellation of the elevated railroad lease, it would involve serious loss to the public both in transportation privileges and in money.

The Manhattan Railway is an integral part of the Interborough system and is being operated for the same fare as the subway. If the lease is broken and it is operated separately, the fare on certain of its lines may under its charter be increased to 10 or even 15 cents. In that event a large proportion of the passengers now using that line would undoubtedly attempt to use the subway. The result would be disastrous from the operating standpoint.

The subway has carried more than 4,000,000,000 passengers since it opened on Oct. 27, 1904, with a loss ratio of passengers on trains of less than two passengers to 1,000,000,000 carried.

In the accompanying chart, covering the operation of the Interborough from 1905 to 1920, are shown the yearly increases and decreases of several items. The operating ratio was about 40 per cent until 1918. It was 61.7 per cent in 1920. The total passenger traffic has been increasing considerably each year. In 1905, 339,104,820 passengers were carried; in 1915, there were 647,378,266, almost doubling those in 1905, and in 1920, only five years later, the passengers carried almost trebled those of 1905, reaching the total of 955,133,110. This increase in the number of passengers has been mainly due to the subway increase.

Riding Habit Shows Increase

Despite Increase in Average Fare, Passengers per Car-Mile Increase from 7.3 to 7.5

Conditions in the electric railway industry during the last six months are reflected in the accompanying tables of operating statistics compiled by the bureau of information and service of the American Electric Railway Association from the monthly operating reports of fifty electric railways. On the whole the tables are encouraging. While there is no indication that the electric railways will have to struggle with the difficulties and problems said to accompany a too sudden visitation of prosperity after lean years, there is evidence that by wise management and careful economy the companies may manage to keep themselves off the rocks until the slowly returning tide of good business conditions sets in and lifts them gently but none the less surely beyond the reach of possible default, receivership and foreclosure.

THE most favorable feature of these tables is the increase in the net income after all expenses and charges were paid. Table I shows that the net income, or profits, of these fifty companies increased from $3,506,965 in the six months ended June 30, 1919, to $5,511,757 for the same period in 1920. On a per car-mile basis, as shown in Table III, these profits amounted to 1.6 cents per car-mile in 1919 and 2.5 cents in 1920.

TABLE I—COMPARATIVE SUMMARIZED INCOME STATEMENT OF FIFTY ELECTRIC RAILWAYS FOR THE SIX MONTHS ENDED JUNE 30, 1919 AND 1920

	Six Months Ended			
	June 30, 1920	June 30, 1919	Increase or (d) Decrease	Per Cent Increase
Railway operating revenue	$94,414,507	$79,032,511	$15,381,996	19.5
Railway operating expenses	72,208,325	58,901,475	13,306,850	22.6
Net operating revenue	22,206,182	20,131,036	2,075,146	10.3
Operating ratio (per cent)	76.5	74.5	....	....
Net revenue: Auxiliary operations	$4,214,060	$3,423,253	$790,807	23.1
Taxes	5,868,809	5,248,082	620,727	11.8
Operating income	20,551,433	18,306,207	2,245,226	12.3
Non-operating income	2,084,354	1,861,676	222,678	11.9
Gross income	22,635,787	20,167,883	2,467,904	12.2
Deductions from gross income	17,124,030	16,660,918	463,112	27.8
Net income	5,511,757	3,506,965	2,004,792	....
Ratio: Net income to operating revenue	5.8	4.4	....	....

The ratio of net income to operating revenue is shown in Table I to have been 4.4 per cent in 1919 and 5.8 per cent in 1920. This means that out of every dollar taken in as revenue the company's share amounted to 4.4 cents in 1919 and 5.8 cents in 1920.

TABLE II—COMPARATIVE SUMMARIZED STATEMENT OF THE OPERATING EXPENSES OF FIFTY ELECTRIC RAILWAYS FOR THE SIX MONTHS ENDED JUNE 30, 1919 AND 1920

(Subdivided according to the Interstate Commerce Commission classification)

	Six Months Ended			
	June 30, 1920	June 30, 1919	Increase 1919–1920	Per Cent Increase
Way and structures	$9,062,506	$7,433,558	$1,628,948	21.9
Equipment	8,945,533	7,919,729	1,025,804	13.0
Power	9,762,125	8,829,480	932,645	10.6
Conducting transportation	32,261,860	25,671,933	6,589,927	25.7
Traffic	154,117	127,313	26,804	21.1
General and miscellaneous	9,174,637	7,666,861	1,507,776	19.7
Transportation for investment—Cr	51,834	41,084	10,750	26.2
Total operating expenses	a$72,208,325	b$58,901,479	$13,306,846	22.6

a Includes $2,899,381 undistributed expenses.
b Includes $1,293,689 undistributed expenses.

The increase in net income should be considered always in connection with this ratio of net income to revenue or one is apt to be led to misleading conclusions.

It should not be forgotten also that the increase is calculated over a year which was next to the worst one in the history of the industry, when the margin of profit was not far from the vanishing point. If the net incomes for the last five years of a group of companies is placed side by side, it will be seen at a glance that the industry was a long way from the normal conditions prevailing in 1914. However, any disposition to exaggerate the importance of the increase in net income should be immediately restrained by

TABLE III—COMPARATIVE SUMMARIZED INCOME STATEMENT (ON A CAR-MILE BASIS) OF FIFTY ELECTRIC RAILWAYS FOR THE SIX MONTHS ENDED JUNE 30, 1919 AND 1920

	Six Months Ended			
	June 30, 1920 (Cents per Car-Mile)	June 30, 1919 (Cents per Car-Mile)	Increase or (d) Decrease (Cents per Car-Mile)	Per Cent Increase
Railway operating revenue	43.0	36.8	6.2	16.8
Railway operating expenses	32.9	27.4	5.5	20.1
Net operating revenue	10.1	9.4	0.7	7.4
Operating ratio (per cent)	76.5	74.4	..	...
Net revenue: Auxiliary operations	1.9	1.5	0.4	18.7
Taxes	2.6	2.4	0.2	8.3
Operating income	9.4	8.5	0.9	10.6
Non-operating income	0.9	0.9	.	.
Gross income	10.3	9.4	0.9	9.6
Deductions from gross income	7.8	7.8	...	...
Net income	2.5	1.6	0.9	....

a consideration of the ratio of the net income to the revenue. In spite of the increase in the net, this ratio amounts to less than 6 per cent and when it is remembered that out of this 6 per cent, sinking funds and other reserves must be credited, it can be appreciated that there is apt to be little left for dividends—nothing at all in fact for the common stock.

OPERATING RATIO INCREASES

Another significant feature of the tables is the increase in the operating ratio, which rose from 74.5 per cent in 1919 to 76.5 per cent in 1920. The cause of this is not far to seek—expenses are still increasing faster than revenues, as Table I clearly shows. Revenues increased 19.5 per cent while expenses were increasing 22.6 per cent. Only the increase in fares ameliorated the situation.

TABLE IV—COMPARATIVE SUMMARIZED STATEMENT (ON A CAR-MILE BASIS) OF THE OPERATING EXPENSES OF FIFTY ELECTRIC RAILWAYS FOR THE SIX MONTHS ENDED JUNE 30, 1919 AND 1920

(Subdivided according to the Interstate Commerce Commission classification)

	Six Months Ended			
	June 30, 1920 (Cents per Car-Mile)	June 30, 1919 (Cents per Car-Mile)	Increase, 1919–1920 (Cents per Car-Mile)	Per Cent Increase
Way and structures	4.1	3.5	0.6	17.1
Equipment	4.1	3.7	0.4	10.8
Power	4.4	4.1	0.3	7.3
Conducting transportation	14.7	12.0	2.7	22.5
Traffic	0.07	0.06	0.01	16.7
General and miscellaneous	4.2	3.6	0.6	16.7
Transportation for investment—Cr.	0.02	0.02	....	....
Total operating expenses	a32.9	b27.4	5.5	20.1

a Includes 1.3 cents per car-mile undistributed expenses.
b Includes 6 cents per car-mile undistributed expenses.

Reference to Table V shows that the average fare of these fifty companies increased from 6.1 cents in 1919 to 7.0 cents in 1920 or 15 per cent. Without this increase in fares the moderate surplus now shown would have been a deficit too large for the industry to carry.

TABLE V—MISCELLANEOUS STATISTICS AND DERIVED RATIOS FOR THE SIX MONTHS ENDED JUNE 30, 1919 AND 1920, OF THE FIFTY COMPANIES SHOWN IN TABLES I TO IV

	Six Months Ended	
	June 30, 1920	June 30, 1919
Revenue passengers	1,306,067,021	1,246,096,316
Passenger revenue	$74,530,625	$60,930,523
Transfer passengers	324,472,362	311,825,847
Car-miles operated	219,447,784	214,708,299
Miles of single track	7,265	7,265
Average maximum number of cars operated daily (38 companies)	9,168	9,168
Ratio: Transfer passengers to revenue passengers (per cent)	24.3	25.0
Average fare per revenue passenger	7.0c.	6.1c.
Revenue passengers per car-mile	6.0	5.8
Total passengers (revenue and transfer), per car-mile	7.5	7.3
Car-miles per car-annually thirty-eight companies)	*38,500	*37,804
Car-miles per mile of single track—annually	*60,406	*59.'02
Passenger revenue per mile of single track—annually	*$25,186	*$[illegible]50
Passenger revenue per car-mile	41.7c.	5.4c.
Passenger revenue per maximum revenue car operated—annually	*$16,258	*$13,292

* Estimated figure for the year based on six months' report.

The electric railways continue, however, to pay their share of taxes. In 1919 taxes amounted to $5,248,082 and in 1920 to $5,868,809, an increase of 11.8 per cent. Table III shows this amounts to 2.4 cents per car-mile in 1919 and 2.6 cents per car-mile in 1920, a greater amount, it will be noted, than the net income. These companies paid more money to the government in taxes than they took out of the business in profits.

Fixed charges remained practically constant. There was an increase of 2.8 per cent in the actual amount, but the amount per car-mile, 7.8 cents, was the same in both years. This would indicate that very little new financing has been done by these companies, due, probably, to the high price of money.

OPERATING EXPENSES INCREASE

In Table II the operating expenses of these fifty companies are subdivided according to the main divisions of the Interstate Commerce Commission's classification of accounts, and the per cent increase of each item is shown. It will be noted that the cost of conducting transportation shows the greatest increase, 25.7 per cent, which, of course, was to be expected as it includes the wages of trainmen and consequently reflects the recent increases in the price of labor. It cost these fifty companies $6,589,927 more to operate their cars during the first six months of 1920 than it did during the same period in 1919.

The next item in point of increase was maintenance of way and structures, which increased 21.9 per cent. Maintenance of equipment, on the other hand, increased 13.0 per cent. Both increases were due to increased costs of labor and materials. The relatively greater increase in the costs of maintenance of way and structures was probably caused by the companies spending extra amounts on improving their lines this year to make up for deferred maintenance during the war period.

The actual cost of power to operate the cars of these companies for six months increased 10.6 per cent in 1920 over 1919. The cost per car-mile in 1919 was 4.1 cents and in 1920 4.4 cents, an increase per car-mile of 7.3 per cent.

The general and miscellaneous operating expenses, including the cost of injuries and damages and the salaries of general officers and general office clerks, increased 19.7 per cent. The cost per car-mile of this item was 3.6 cents in 1919 and 4.2 cents in 1920, the increase per car-mile being 16.7 per cent.

RIDING HABIT GROWS

In Table V are shown the revenue passengers, passenger revenue, transfer passengers, car-miles operated, miles of single track and number of cars operated daily. Following these are a number of ratios derived from the above data. The most interesting of these is probably the average fare per passenger, which, as before mentioned, increased from 6.1 cents in 1919 to 7.0 cents in 1920.

Another interesting fact brought out in this table is the increase in the number of passengers per car-mile from 7.3 in 1919 to 7.5 in 1920. This increase in the riding habit is especially significant at this time in conjunction with the increase in fare, and refutes the statement, often made, that higher fares would stunt the growth of electric railway transportation.

The ratio of transfer passengers to revenue passengers fell off slightly, from 25.0 per cent to 24.3 per cent, reflecting the elimination of fare transfers by a number of electric railway companies.

The number of car-miles per car and per mile of single track increased slightly, indicating more efficient use of the existing equipment.

Duluth Decrease Continues

A falling off of $21,918 was shown in the net income of the Duluth-Superior Traction Company, Duluth, Minn., during July, as compared with three years ago. Though the company's gross revenue gained $20,624, operating expenses scored an increase of $37,665. For the year to July 31, the net income of the system showed a decrease of $131,140, as compared with the same period in 1917, though the gross revenue increased $229,037.

Comparative operating figures of the railway for July and for the year to Aug. 31 as reported by the company were:

Month of July	1920	1917
Gross revenue	$163,339	$142,715
Operating expenses	125,609	87,944
Net revenue	$37,730	$54,771
Interest, sinking fund, and taxes	29,604	24,727
Net income	$8,126	$30,044
Year ended Aug. 31	1920	1917
Gross revenue	$1,145,487	$916,450
Operating expenses	922,048	577,340
Net revenue	$223,439	$339,110
Interest, sinking fund, and taxes	182,729	167,260
Net income	$40,710	$171,850

Conference Committee Appointed

At the annual meeting of the stockholders of the Union Traction Company, Philadelphia, Pa., on Sept. 15, the retiring directors were re-elected, except that John A. Murphy was chosen to fill the vacancy caused by the resignation of Thomas E. Mitten.

The directors met on Sept. 20 and reelected the retiring officers. Action was taken upon a letter received from the Philadelphia Rapid Transit Company asking for a conference with representatives of the board, to discuss the issuance of $6,000,000 equipment trust certificates. The following committee was appointed: Joseph Gilfillan, Charles Heed, Charles McManus and Arthur Morton.

After the meeting all inquiries were referred to Mr. Gilfillan. He said the sub-committee appointed is really a continuance of the old committee, and cannot consider or even discuss the rentals of the underlying companies. When asked as to what the sentiment of the board meeting was regarding the helping of the Philadelphia Rapid Transit Company over its present difficulties he said that "the United Traction is willing to go in and help the Philadelphia Rapid Transit all we can."

Financial News Notes

Midland Road Resumes.—The first car to be put into operation for passenger service on the Midland Railway, Staten Island, N. Y., which suspended in January, left St. George, S. I., at 8 o'clock on Monday, Sept. 20, for Four Corners.

Car-Finance Plan Before Commission.—The Empire State Railroad Corporation, Syracuse, N. Y., has asked the Public Service Commission for the Second District, for authority to issue $70,000 in equipment trust notes to enable the company to purchase three new interurban cars, one double-truck snow sweeper and one double truck snow plow.

No Payment on London Underground Incomes.—The New York Stock Exchange on Aug. 30 was informed that the profits of the Underground Electric Railways, Ltd., London, England, for the six months ended June 30, 1920, do not warrant the payment of any interest on the 6 per cent income coupon bonds, due in 1948, and therefore Coupon No. 25 has no value.

Syracuse Lines Valued.—The commission which has been considering the street railway situation as it affects the Syracuse lines of the New York State Railways has reported a present property value of $12,450,000 against $21,012,201 claimed by the corporation. It has also, in its report to the Mayor, suggested a 10-cent cash fare and a ticket fare of 7½ cents under a service-at-cost arrangement. The report is referred to at length elsewhere in this issue.

Memphis Went Behind.—The report of the Memphis (Tenn.) Street Railway for August will show a deficit of approximately $13,000 according to unofficial information. Officials of the company declare that had the 7-cent fare been effective throughout the month, however, a surplus of several thousand dollars would be shown. Approximately 4,500,000 passengers were carried during the month. This is regarded as good business for that particular month. Seven-cent fare became effective on Aug. 18, giving the company fourteen days under the increased rate during the month.

St. Louis Earnings Improve.—The United Railways, St. Louis, Mo., cleared $235,092 for the month of July, according to the monthly report of Rolla Wells, receiver, filed in the United States District Court. The receipts were $1,730,704, while disbursements were $1,495,612. The balance on hand July 30 was $585,602. On June 30 the balance was only $350,511. The receiver has deposited $83,165 for the payment of bond coupons, $50,000 of the amount being set aside to take care of the St. Louis & Suburban Railway consolidated mortgage bonds. Bond coupons due since the receiver took charge amount to $610,887, according to the report. A report for the Missouri Electric Railroad was also filed. It gives receipts at $22,650 and disbursements at $13,627.

Sale of Collateral Ordered.—The 181,860 shares of stock of the American Railways, Philadelphia, Pa., pledged as collateral for the 4-6 per cent bonds of the National Properties Company, will be sold at public auction on Nov. 8 at the Federal Building, Wilmington, Del., by special master. The proceedings in the case were instituted by the Continental-Equitable Trust Company, trustees for the bonds, at the request of the so-called Randolph committee. The order for sale was made by the United States District Court. The plan provides the usual authority for the committee to buy in the collateral at the sale for purposes of the proposed reorganization. The plan for the reorganization has been referred to previously in the ELECTRIC RAILWAY JOURNAL.

$1,000,000 Reissue Proposed. — The Dallas (Tex.) Railway has applied to the City Commission for permission to reissue $1,000,000 gold certificate notes, which matured on June 15, 1920, and at that time were taken up by the General Electric Company. In its application for permission to reissue the notes, Richard Meriwether, vice-president and general manager of the traction company, explains that this note issue of $1,000,000 was originally sold to Scandinavian interests and bore 7 per cent interest. A bonus of $50,000 was paid to the Scandinavian interests, which brought the cost of the money to 9 per cent. The company can now reissue these notes and effect a saving of 2 per cent, Mr. Meriwether explained, by extension of date of maturity to Dec. 1, 1927, as the General Electric Company has agreed to carry these notes to this date at 7 per cent.

Seeks to Issue Bonds for Improvements. — The Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., in an application to the Public Service Commission for the Second District, asks for authority to issue $243,000 of 6 per cent mortgage bonds, to realize not less than $208,980 instead of $130,000 authorized by the commission in July, 1919, for new construction and betterments to its system between Poughkeepsie and Wappingers Falls. The company alleges that changes in the market prices of materials and labor have occurred since 1919 and that the estimated cost of $130,000 does not represent amounts which will in all cases be required to be expended for prosecution of the work. The company now asks that the $130,000 order be so amended as to permit the company to issue the larger amount of bonds, to be charged to the company's fixed capital.

Sale of Carhouse Properties Authorized.—For the benefit of the first mortgage holders Judge Julius M. Mayer in the Federal District Court at New York has issued a decree of foreclosure and sale directing the receiver for the New York Railways to sell five large parcels of property now in his possession. An upset price of $2,500,000 is put upon parcel A, which contains the entire block between Thirty-second and Thirty-third Streets and Fourth and Lexington Avenues; parcel B, comprising 711 to 717 East Eleventh Street; parcel C, most of the frontage between East Tenth and East Eleventh Streets, Avenue C and Dry Dock Street; parcel D, the block front on the west side of Madison Avenue between Eighty-fifth and Eighty-sixth Streets, and parcel E, a plot between Broad and Moore Streets, consisting of a storage warehouse building on a plot.

Redemption Plan Advanced.—Rolla Wells, receiver for the United Railways, St. Louis, Mo., has issued a circular to bondholders of the old St. Louis Railroad offering to replace the 4½ per cent bonds of the old company with three-year receiver's certificates bearing 7 per cent interest. The bonds aggregate $1,900,000. They matured on May 1, but under the terms of the mortgage, six months grace was allowed. This period of grace ends on Nov. 1, when the bonds must be paid if a foreclosure is to be avoided. The bonds are a lien on only one line, the Broadway line. Some opposition to the plan has been manifested by bondholders because the receiver proposes to pay only 4½ per cent interest upon the bonds for the period of grace instead of 6 per cent. Several bondholders contend also that the receiver's certificates should bear interest at 8 per cent or better instead of 7 per cent in view of existing rates for money on loan.

Traffic and Transportation

Retrenchment Ordered

Cincinnati Company Directed to Cut Non-Rush-Hour Service to Preserve 8-Cent Fare

Adoption by the Cincinnati (Ohio) Traction Company of a policy of retrenchment has been ordered by William C. Culkins, City Street Railway Director. Mr. Culkins has directed the railway to cut its non-rush-hour service to the bone and to introduce other economies of operation. These steps are necessary, states Mr. Culkins, if the company is to continue to operate on an 8-cent fare.

INCREASE IN BUDGET REFUSED

The railway recently applied to Mr. Culkins for an increase in its operating allowances which, if granted, would have raised the total of operating expenses for the current year from $5,499,346 to $6,373,434. The company stated that this supplementary allowance was made necessary by the advance in costs incidental to the recent switchmen's strike and the award of an 18 per cent raise in pay to its employees. Mr. Culkins denied the company's request, ordering the reduction of service as an alternative. In taking this course he maintained that by adhering to a policy of rigid economy the railway would be able to care for the added operating costs at the present fare.

Under Mr. Culkins' plan service is to be adjusted to meet varying traffic conditions. A recent traffic survey showed that the number of cars operated during the non-rush-hour periods was unnecessarily large. The standard of service called for under the new ruling requires that during the non-rush hours there shall be provided in each half-hour period an average of as many seats as there are passengers. During the morning and evening rush hours sufficient cars are to be operated in each quarter-hour period to provide fifty seats for each eighty passengers on cars of the cross-seat type and fifty seats for each 100 passengers on cars of the longitudinal-seat type.

Mr. Culkins explained the reasons for his order as follows:

> The change of a few minutes in headways during the middle of the day would produce no appreciable inconvenience, but would materially reduce the operating expenses on the whole system and benefit the car-riding public, who will, I am sure, co-operate cheerfully in the working out of any economy which does not reduce service below the standard established.
>
> ECONOMIES SUGGESTED
>
> I call your attention to the matter of improved running time on many lines and adjustments on others and the substitution as soon as possible of double-truck for single-truck cars where conditions allow. As soon as finances permit cars should be equipped with fare boxes, and whenever necessary remodeled to standardize collection methods, and with recording meters for better control and saving of power. One-man car operation, through-routing, cross-town connections and other matters have been previously called to your attention, and the need of conservation is greater now than at any other time.
>
> The total supplementary allowances requested would increase the total operating expenses for the year 1920 from $5,499,346 to $6,373,434 and require a total including taxes, rentals and other deductions of $9,628,111. The total receipts for the first eight months of this year were $5,809,471.
>
> TRAFFIC INCREASE SLIGHT
>
> It seems reasonable, however, in view of the fact that the unusual weather and other conditions in the past summer were abnormal, to expect an increase in traffic, but the number of revenue passengers for the last four months of 1920 will probably not exceed 42,500,000, or 2,500,000 more than in 1919. This would produce at an 8-cent fare approximately $3,440,000, or a total for the year of $9,249,000, or $379,000 less than the total allowance under the supplementary budget as requested. However, I am of the opinion that with the economies suggested the company will be able to pay the new wage scale and still materially reduce expenses so that it will be possible to avoid increasing the present rate of fare.

Safety Cars for Jersey

One-man safety cars have made their appearance on the lines of the Public Service Railway of New Jersey. Several months ago the company ordered 200 of these cars together with 100 trailer cars for use on the various parts of its system. The first batch of "safeties" has now arrived and the cars have been placed in service on three lines in Paterson, an industrial center in the northern part of the state. As more cars are commissioned for service they will be placed in operation in other cities served by the railway.

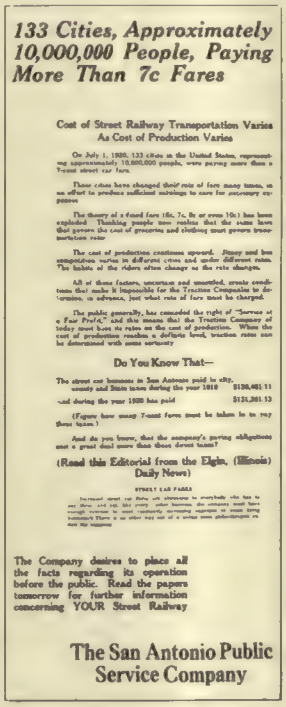
Publicity Work Successful

San Antonio Company Conducts Campaign of Education in Preparation for Fare Increase

A well-directed campaign of publicity played an important part in a recent increase in fare in San Antonio, Tex. The San Antonio Public Service Company announced early in August that it must have more revenue and that the rate of fare would have to be raised in consequence. The company proposed to replace the 7-cent fare under which it had been operating for several months with one of 8 cents.

Realizing the importance of having the support of the car riders of San Antonio, the railway management started an extensive advertising campaign.

In addition to the posting of notices of the proposed change in fare in its cars, it ran large advertisements in the San Antonio daily newspapers, explaining to the public just why higher fares were necessary.



133 Cities, Approximately 10,000,000 People, Paying More Than 7c Fares

Cost of Street Railway Transportation Varies As Cost of Production Varies

On July 1, 1920, 133 cities in the United States, representing approximately 10,000,000 people, were paying more than a 7-cent street car fare.

These cities have changed their rate of fare many times, in an effort to produce sufficient earnings to care for necessary expenses.

The theory of a fixed fare (6c, 7c, 8c or even 10c) has been exploded. Thinking people now realize that the same laws that govern the cost of groceries and clothing must govern transportation rates.

The cost of production continues upward. Jitney and bus competition varies in different cities and under different rates. The habits of the riders often change as the rate changes.

All of these factors, uncertain and unsettled, create conditions that make it impossible for the Traction Companies to determine, in advance, just what rate of fare must be charged.

The public generally, has conceded the right of "Service at a Fair Profit," and this means that the Traction Company of today must base its rates on the cost of production. When the cost of production reaches a definite level, traction rates can be determined with some certainty.

Do You Know That—

The street car business in San Antonio paid in city, county and State taxes during the year 1919 $130,461.11

—and during the year 1920 has paid $131,201.13

(Figure how many 7-cent fares must be taken in to pay these taxes.)

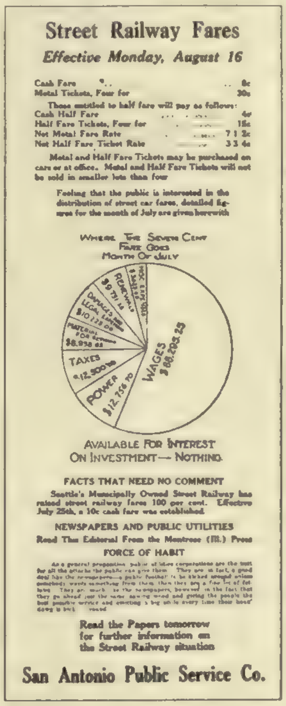
And do you know, that the company's paving obligations cost a great deal more than these direct taxes?

(Read this Editorial from the Elgin, (Illinois) Daily News)

STREET CAR FARES

The Company desires to place all the facts regarding its operation before the public. Read the papers tomorrow for further information concerning YOUR Street Railway

The San Antonio Public Service Company



Street Railway Fares

Effective Monday, August 16

Cash Fare ... 8c
Metal Tickets, Four for ... 30c
Those entitled to half fare will pay as follows:
Cash Half Fare ... 4c
Half Fare Tickets, Four for ... 15c
Net Metal Fare Rate ... 7 1/2c
Net Half Fare Ticket Rate ... 3 3/4c

Metal and Half Fare Tickets may be purchased on cars or at office. Metal and Half Fare Tickets will not be sold in smaller lots than four.

Feeling that the public is interested in the distribution of street car fares, detailed figures for the month of July are given herewith

WHERE THE SEVEN CENT FARE GOES MONTH OF JULY
WAGES $88,293.25
POWER $12,756.70
TAXES $12,500.00
MATERIAL FOR RENEWALS $8,938.
DAMAGES AND LEGAL EXPENSES $10,228.06
RENEWALS $9,731.14
AVAILABLE FOR INTEREST ON INVESTMENT — NOTHING.

FACTS THAT NEED NO COMMENT

Seattle's Municipally Owned Street Railway has raised street railway fares 100 per cent. Effective July 25th, a 10c cash fare was established.

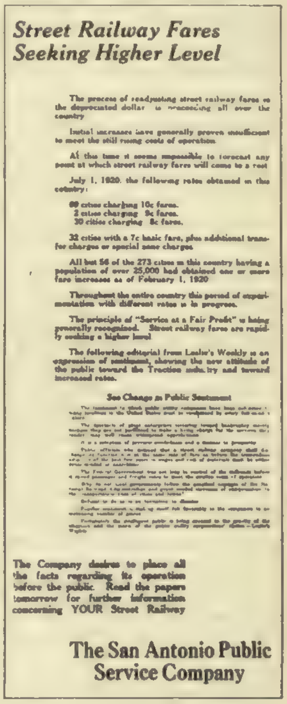
NEWSPAPERS AND PUBLIC UTILITIES

Read This Editorial From the Montrose (Ill.) Press

FORCE OF HABIT

Read the Papers tomorrow for further information on the Street Railway situation

San Antonio Public Service Co.



Street Railway Fares Seeking Higher Level

The process of readjusting street railway fares to the depreciated dollar is proceeding all over the country.

Initial increases have generally proven insufficient to meet the still rising costs of operation.

At this time it seems impossible to forecast any point at which street railway fares will come to a rest.

July 1, 1920, the following rates obtained in this country:

69 cities charging 10c fares.
2 cities charging 9c fares.
30 cities charging 8c fares.

32 cities with a 7c basic fare, plus additional transfer charges or special zone charges.

All but 56 of the 273 cities in this country having a population of over 25,000 had obtained one or more fare increases as of February 1, 1920.

Throughout the entire country this period of experimentation with different rates is in progress.

The principle of "Service at a Fair Profit" is being generally recognized. Street railway fares are rapidly seeking a higher level.

The following editorial from Leslie's Weekly is an expression of sentiment, showing the new attitude of the public toward the Traction industry and toward increased rates.

See Change in Public Sentiment

The Company desires to place all the facts regarding its operation before the public. Read the papers tomorrow for further information concerning YOUR Street Railway

The San Antonio Public Service Company

THESE FARE "ADS" GOT RESULTS

S. J. Ballinger, the company's advertising and commercial manager, was in charge of this educational work. Mr. Ballinger reports that there was little opposition on the part of the car riders to the increase in fare. The 8-cent fare took effect on Aug. 16. Four tickets are sold for 30 cents. Three of the "ads" used by Mr. Ballinger to tell his fare "story" are reproduced above.

In February last the company replaced the zone system with a flat 7-cent fare. Meanwhile the city sought an injunction in the federal courts, and being denied the relief sought, it appealed to the Supreme Court of the United States. The city's appeal is expected to come before the court at the December term.

P. R. T. Must Have More Income

Need for Fare Relief Urged by President Mitten in Statement Before Council Committee—Company "Severely Penalized"

Thomas E. Mitten, president of the Philadelphia Rapid Transit Company, appeared before the members of the transportation committee of the City Council on Sept. 21 to amplify his letter of Sept 14 and to describe the present emergency which confronts that company. Acting under the provision of the 1907 agreement, which requires that fares may be changed from time to time only with the consent of both parties, the company has petitioned the city to assent to the collection of a straight 5-cent fare without transfer or exchange tickets. This is intended as a measure of temporary relief, to continue until the value of the company's property, for rate making purposes, can be finally determined, as required by law.

THE full inventory of the company's property was expected to be ready for presentation to the Public Service Commission on Sept. 23; the pricing of the parts is incomplete, but is expected to be accomplished with sufficient rapidity to keep ahead of the city and Public Service Commission representatives, so that there need be no delay. Verification of the valuation cannot be completed for rate making purposes for many months to come. Meantime, the company must have more money or go to the wall. A synopsis of Mr. Mitten's statement follows:

The company's operating statement, just made public, shows a deficit of $425,354 for the month of August. An accumulated deficit has been built up by months, in varying amounts, until the deficit now represents $1,151,628 for the eight months ended August 31. The operating deficit for the next twelve months will exceed $4,000,000, against which the straight 5-cent fare, without transfers or exchanges, is estimated to bring in about $350,000 a month. The need of increased earnings is two-fold: the amount required to pay actual operating costs being necessary in order that the cars may be kept running; the amount to pay the agreed 5 per cent dividend on P. R. T. stock is required in order that P. R. T. credit be sufficiently established as to make its guarantee on bonds issued for desired extensions of sufficient value to make them salable.

BENEFITS OF AGREEMENT ANALYZED

Under the agreement of 1907 it was evidently intended that any change in fares should be justified before being agreed to by the city. The true test of a contract, after its having been in effect for thirteen years, and the fairness of its terms, is best determined by a review of the benefits actually received by each of the parties.

The 1907 agreement was accepted by the press and public representatives, after much publicity and investigation, as being the most perfect solution then possible.

The P. R. T. stockholder had already paid in $18,000,000 and was induced by the making of the 1907 agreement to pay in the remaining $12,000,000 of the $30,000,000 P. R. T. capital stock, in the hope and expectation that he would receive 6 per cent per annum on both the $18,000,000 which he had formerly paid in, as well as 6 per cent per annum on the $12,000,000 of new money which he was required to pay in under the terms of the 1907 agreement.

What has been the result to this hopeful P. R. T. stockholder? As against his having received 6 per cent per annum on the whole $30,000,000 of paid in capital, as he had been led to believe, and which would in total represent $24,000,000, he has actually received in dividends only $5,847,000. P. R. T.'s stock is, at present market, worth only $14 a share, or an aggregate of 8,400,000, as against its paid in capital of $30,000,000.

The P. R. T. stockholder has never received any return upon his $18,000,000 paid in prior to 1907, and has received an average of 3 per cent per annum upon the $12,000,000 paid in under the terms of the 1907 agreement. The entire $30,000,000 of capital stock, if sold on today's market, would bring back only $8,400,000, or $3,600,000 less than the money paid in by the stockholder after the making of the 1907 agreement.

What has been the result to the city of Philadelphia during this same period since 1907?

The city secured the completion of the Market Street elevated, by which West Philadelphia taxable values were increased considerably more than $100,000,000. This high-speed line is more than $5,000,000 short of having earned 6 per cent per annum upon its actual cost, but it has been, and is still supplying, a combined elevated and surface car ride for 5 cents, which cannot be continued. It has been urged that the city's consent to increased revenue should be withheld until a valuation is determined, or until something could be done to reduce the rentals to underlying companies. If the city now makes the mistake of refusing to consent to an immediate increase in revenue, P. R. T. must fail, and the city will have exchanged the substance of a management which has already saved millions in operating costs, for a shadow, which is represented in the hope of decreasing P. R. T.'s fixed charges, through the valuation of its property, or a reduction in underlying rentals, neither of which can possibly offset the loss which would follow a return to conditions of labor and management such as were formerly here.

Except for the good work of P. R. T.'s men there is no reason why the Public Service Commission would not before this have been obliged to give the same relief to P. R. T. by way of a 10-cent fare, as the commission has already allowed in Pittsburgh.

No other street-car company in the state has served its city during the war in any way to compare with P. R. T.

No other company serves its people so well and no other company has such a priceless asset to the city it serves as is represented in the loyalty and faithful service of P. R. T. employees; and yet P. R. T. is the only electric railway in Pennsylvania that has been thus far refused increased revenue at the hands of the Public Service Commission.

The Mayor and City Council have urged that the question of increased revenue is for the city to decide under the terms of the 1907 agreement. The company has met this suggestion by withdrawing its July application from the Public Service Commission, and now rests its case, hoping that the city, having assumed the responsibility, will rise to the emergency and assent to the temporary relief required to save P. R. T. from bankruptcy.

Seven Cents in Fort Wayne

The Indiana Public Service Commission, finding that the Indiana Service Corporation, Fort Wayne, has been operating the Fort Wayne city lines at less than a fair profit, has authorized a temporary fare rate of 7 cents with four tickets for 25 cents. The new rates are to stand for a period of sixty days from Sept. 15, pending the final decision of the commission, which will be made as soon as possible.

Robert M. Feustel, president of the company, states that all the employees of the company will be given a wage increase which will total about $150,000 a year. The men operating the city cars will be given a new scale of 46 to 53 cents an hour. They formerly received 40 to 45 cents. This advance in pay is being granted in spite of the uncertainty concerning the final decree of the commission because, Mr. Feustel says, the company believes that the employees are entitled to recognition for their loyal services during this abnormal period.

Mr. Feustel also expresses the hope that the new wage scale will alleviate the labor shortage from which the company has been suffering for some time. The shortage of men has been felt very keenly by the company and for several weeks there have not been sufficient trainmen to take out all scheduled cars. Track improvement work has also been hindered by the shortage of labor.

In its permanent order the commission is expected to authorize the service-at-cost plan for the local lines. In case this plan should be adopted the initial fare will probably be the same as the rate under the temporary increase.

Service Resumed in Bridgeport

Electric cars made their reappearance in Bridgeport, Conn., on Sept. 20. Their return marked the termination, temporarily, at least, of a long-drawn-out controversy between the Connecticut Company, operating the Bridgeport lines, and the local jitney drivers. It also marked the end of trolley-jitney competition in Bridgeport, a condition of the resumption of service by the company being that motor buses should no longer be permitted to operate in the principal thoroughfares served by the railway.

Bridgeporters were without trolley service for exactly eight weeks. Early in July the company announced that, unless jitney competition were curbed by the city authorities, it would be forced to cease operation of its local lines. The Bridgeport Common Council, after an investigation of local traffic conditions, passed an ordinance which, it was thought, would solve the problem by placing the buses under rigid control. This measure was declared illegal by Judge Banks on the ground that it delegated the power of the Council to regulate traffic to the board of police commissioners.

The company thereupon suspended service on its Bridgeport division. The Council took no immediate action looking to the passage of a new jitney ordinance free from the features ruled out by Judge Banks. Finally, acceding to popular demand for the restoration of trolley service, the Council passed an ordinance barring the buses from the streets containing electric railway tracks. The new law, which also became effective on Sept. 20, designates five routes which the jitneys are required to follow. The bus service is thus made complementary to rather than competitive with that of the railway.

An ordinance barring jitneys from certain streets was recently passed by the Board of Aldermen of New Haven. The measure designates eleven thoroughfares from which the buses are barred.

London Tubes Raise Rates

A bill has been passed by Parliament giving permission to the London Underground Railways to raise their fares. The powers granted to the companies under the new act will permit the continuance of the policy of preference to the long-distance passenger. Under the terms of the act the Underground systems are empowered to charge ordinary fare at a rate not exceeding 1½d. a mile or part of a mile with a minimum of 2d., while workmen's tickets will be issued up to 7:30 a.m. on all the systems, and will be available for the return trip any time during the day, at a rate not exceeding the ordinary single fare on the double trip, with a minimum of 3d. (return).

In a recent statement issued by the companies, it is pointed out that these are maximum rates, designed to provide the companies with a reasonable margin within which to operate, without the necessity of constant reference to Parliament. Even for short trips in the inner areas it may not be necessary to make full use of the maximum charge. It is pointed out that the necessary increases will be imposed where they will be least felt, and the long-distance fare under the new schedule will still be found to work out at a very cheap mileage rate, both positively and relatively.

Transportation News Notes

Searchlight Trips Resumed.—The Niagara Gorge Railway, Niagara Falls, N. Y., has resumed the operation of searchlight trips through the lower gorge of the Niagara River. A flat car equipped with powerful electric searchlights accompanies passenger cars on the trip through the gorge.

May Raise Astoria Fare.—Guy Talbot, president of the Pacific Power & Light Company, Astoria, Ore., has announced that the company will shortly take steps to raise the fare on its Astoria lines. The new rate would be 7 cents. The company now charges a 5-cent fare.

Six Cents on Arkansas Lines.—The City Council of North Little Rock, Ark., has passed an ordinance authorizing the Intercity Terminal Railway to charge a 6-cent cash fare on its local lines. The company is now charging a 5-cent fare. Before becoming effective the increase must be approved by the Arkansas Corporation Commission.

Freight Rates Up in Minnesota.—Thirteen electric railways operating interurban lines in Minnesota have received permission from the State Railroad & Warehouse Commission to raise their freight rates. The advance in the charge for transporting milk is 20 per cent. Rates for other commodities are advanced 35 per cent.

Standees May Be Barred.—Standing between the seats of open cars on the New Bedford, Mass., lines of the Union Street Railway will become a misdemeanor if an ordinance now awaiting the consideration of the New Bedford Common Council becomes law. The proposed measure stipulates that no passenger can be permitted to "ride between the seats in open cars."

Asks Rise in Huntington.—A petition requesting permission to advance the basic fare in Huntington, W. Va., from 5 to 6 cents was filed recently with the State Public Service Commission by the Ohio Valley Electric Railway company. The company has applied to the Interstate Commerce Commission for an increase in its interstate rates. It recently raised the fare on its lines in Ironton, Ohio.

Suburban Fare Advanced.—Effective Sept. 9, the fare on the line of the Portland Railway, Light & Power Company between Portland, Ore., and Vancouver, Wash., was advanced from 15 to 17 cents. The increase was accomplished by increasing the fare between Columbia Boulevard and Vancouver from 7 to 9 cents. The new fare is less than half of that charged by the jitneys, which have maintained a rate of 35 cents each way for several months.

Would Charge Ten Cents in St. Joseph. — The St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., has applied to the State Public Service Commission for permission to raise its fare from 7 cents to 10 cents. The application is in the form of a supplementary petition filed with the commission at the opening of a hearing upon a previous application by the company for a 9-cent fare. Attorneys for the company stated that a 9-cent fare, if it is granted, would not prove adequate.

Ten Cents in Sydney.—A 10-cent cash fare was placed in effect on the lines of the Cape Breton Electric Company, Sydney, N. S., on Aug. 15. Tickets are sold by the company at the rate of four for 30 cents. The fare was formerly 6 cents. The increase was authorized by the Nova Scotia Board of Public Utility Commissioners in an order handed down on Aug. 5. The company conducted an extensive advertising campaign, prior to putting the new rates into effect.

"Safeties" Soon on Dallas Lines.—Four of the fifty one-man safety cars recently ordered by the Dallas (Tex.) Railway have been shipped from the factory in Philadelphia, according to notice received by Richard Meriwether, vice-president and general manager, and are expected to arrive in Dallas before the end of September. These cars are expected to arrive in Dallas in time to be put in service for the Texas State Fair which will open Oct. 9 to continue for fifteen days.

Will Halt Transfer Abuse.—To halt the abuse of the transfer privilege on its lines, the Los Angeles (Cal.) Railway is introducing a new form of transfer throughout its system. The modified transfers are designated by letters corresponding with the various lines. The key-letter will be so large that it can be noted at a glance and will stop misuse of the transfer privilege, which has cost the company an average of $2,000 per day. The new transfers have already been placed in service on five of the company's lines.

Ten - Cent Fare Stands.—Ten cents will continue to be the cash fare charged by the Michigan Railway on its lines in Battle Creek, Mich., for at least sixty days longer. The State Public Utilities Commission at a recent hearing granted the company permission to retain the 10-cent fare temporarily. The city of Battle Creek had sought to have the rate reduced. The fare was raised by agreement among the commission, the city and the company last June. Traffic for the month of July showed a falling off of 24 per cent as compared with the traffic for the same month a year ago.

Six Cents in Sioux City.—Six cents became the fare charged by the Sioux City (Iowa) Service Company on Sept. 10. The company was recently authorized by the voters to raise its rate from 5 cents to 6 cents. The increase had previously been recommended by a committee of citizens after a careful investigation of the company's needs. New tokens and fare registers ordered by the railway are not expected to arrive until October. In the meantime the old tokens are being sold at the rate of seventeen for $1. The company recently raised the wages of its employees.

Tokens in Dallas.—The Dallas (Tex.) Railway has installed new fare boxes in all its cars for handling metal tokens and pennies. The old boxes were not designed to register pennies, and changes were necessary. Conductors were supplied with pennies and the company has insisted on payment of fares in the form of a nickel and one penny up to this time, but now fares may be paid in any manner desired and 6 pennies dropped into the fare box if the patron desires. The company has put on sale metal tokens in packages of twenty for $1.20. These may be purchased at all the leading department and drug stores in the city, as well as at the offices of the company.

Would Raise Saginaw Fares.—Russell B. Palmer, general superintendent of the Saginaw-Bay City Railway, Saginaw, Mich., recently appeared before the City Council of Saginaw to ask that the company be allowed a material increase in fare. Mr. Palmer asked the Council for permission to submit figures to show that the present 6-cent fare is inadequate. While asking for no set increase, the company's petition declared that the 6-cent fare, declared insufficient two years ago in a report presented by Dean Mortimer L. Cooley, was not bringing sufficient returns to pay operating expenses and taxes, to say nothing of maintenance, depreciation or interest on the investment.

Fare Rise Urged for New Orleans.—An 8-cent cash fare is recommended for the New Orleans Railway & Light Company, New Orleans, La., in the report of the three special masters who have been inquiring into the company's financial condition. The masters have just completed their investigation and in their report have approved an increase in the wages of the company's employees amounting to approximately 30 per cent. They began their work shortly after the conclusion of the strike which tied up electric railway service in New Orleans two months ago. Their report will now be submitted for approval to the Federal District Court, which is in charge of the railway's affairs. The fare is now 6 cents.

More Penn Lines Raise Rates.—Several electric railways operating in Pennsylvania have filed with the State Public Service Commission notice of their intention to increase their fare. The Highland Grove Traction Company, McKeesport, will raise its fare from 5 cents to 10 cents. The Lancaster & York Furnace Street Railway, Millersville, proposes to replace the present 5-cent fare with one at 6 cents. The Lehigh Valley Transit Company, Allentown, and the Conestoga Traction Company, Lancaster, will increase their express rates approximately 19 per cent. The Reading Transit & Light Company, Reading, plans to raise its rates for milk transportation and other freight rates.

Kansas City Rise Waits.—Pending a decision by the Missouri Public Service Commission, there will be no increase in fares on the lines of the Kansas City Railways. The commission considered the railway's application for a rate advance at a hearing ending on Sept. 8, and took the matter under advisement, giving the company ten days in which to file a brief and the city twenty days more in which to file a rebuttal. The company is seeking authority to introduce a flexible-fare system, under which the fare would advance from 8 cents straight to 10 cents cash or three tickets for 25 cents. Representatives of the city government appeared at the hearings to oppose the increase, contending that the company's difficulty was due to over capitalization.

Hearing Soon on Connecticut Fares.—The question of whether or not the Connecticut Company, New Haven, Conn., shall be allowed to increase its fare beyond the 7-cent rate authorized by the State Public Utilities Commission two months ago, will come up for settlement before the commisson at a hearing on Oct. 1. At the time the 7-cent fare was authorized the company informed the commission that this rate would be insufficient to meet its operating expenses, but the rate was allowed to stand until the commission should have an opportunity to make a more thorough study of the company's needs. Individual trustees of the Connecticut Company have expressed themselves as being in favor of a 10-cent fare. They contend that any rate less than a dime will prove insufficient to meet the financial requirements of the system.

Mayor Bars Brockton Buses.—Jitney buses will not operate through the streets of Brockton, Mass., for some time to come, if Mayor William L. Gleason has anything to say on the subject. Mayor Gleason has announced that so long as he remains the city's chief executive, the buses, which were barred from the streets on Dec. 1 last, will not be permitted to return. Announcement of the Mayor's attitude is in answer to a demand that buses from the town of Whitman be allowed to enter the city, owing to the recent increase in fares by the Eastern Massachusetts State Railway. Mayor Gleason calls attention to the fact that last fall, when the jitney controversy was before the public, there was an almost unanimous vote in favor of the electric railway and that as a result licenses of 300 jitney operators were revoked.

Traffic Declines as Fares Go Up.—Many commuters who in going to their daily work in Boston and other cities of Massachusetts formerly used the lines of the Eastern Massachusetts Street Railway are now riding on the steam roads. The falling off of traffic on the electric railway followed an advance of its fare throughout its entire system, made necessary by the recent advance in the wages of its employees amounting to $1,400,000 a year. In most cases the fare on the electric lines was raised from 10 cents to 15 cents in each zone, transfers being abolished. The results of the fare raise are indicated by the case of a steam train leaving for Boston from a nearby city at 6:25 a.m. on Sept. 15. This train carried 146 passengers, whereas formerly the average had been from twenty to thirty passengers.

P. R. T. Seeks Public's Support.—Patrons of the Philadelphia (Pa.) Rapid Transit Company are being given the opportunity to learn at first hand the manner in which they will be affected by the proposed abolition of transfers on the P. R. T. system. Thomas E. Mitten, president of the P. R. T., has adopted the policy of laying the company's case directly before the car-riding public through the medium of advertisements in the Philadelphia newspapers. The company on Sept. 17 printed a full-page map of the city showing the P. R. T. routes to bring out the fact that the great majority of car riders would continue to ride for a nickel. In commenting upon this feature of the contemplated rate change the company pointed out that the discontinuance of transfers would release the equivalent of 300 cars for improved service.

Busmen Unite in Muskegon.—Twenty-four persons operating motor buses in Muskegon, Mich., have incorporated under the name of the Michigan Jitney Bus Company. The new concern is capitalized at $200,000, of which $103,000 is given as the value of the thirty-seven buses owned by the company. Definite routes for the various cars have been mapped out and each bus will operate on schedule time. Snow plows will be purchased, it is said, to keep the routes clear in winter. The fare charged will be 6 cents. No transfers will be given. Each bus will be operated from the outskirts of the city to the main business section. The present rate of fare of the Muskegon Traction & Lighting Company is four tickets for 30 cents or 10 cents cash. The incorporators made the claim that about 60 per cent of the business in Muskegon was now being handled by the buses, which before the incorporation operated individually.

California Buses Ask Rate Increase.—Three motor bus companies operating a system of lines in southern California have applied to the State Railroad Commission for an increase in passenger fares amounting to 20 per cent. The rate advances, if allowed, will affect approximately 90 per cent of the motor buses serving the southern section of the state. The applications for relief were heard by the commission in Los Angeles on Sept. 8. The companies applying for higher fares are the Motor Transit Company, the White Bus Lines, and the Pickwick Stages Company and affiliated lines. These three systems and their affiliations are largely under the control of the Motor Transit Company, the parent organization. They operate 126 autobuses over a system of public highways covering more than 650 miles. This mileage extends from Bakersfield on the north to San Diego and Imperial Valley points on the south. The lines carry 200,000 passengers per month and operate a monthly car mileage of 600,000 miles.

Ten Cents Asked in Albany.—The United Traction Company, Albany, N. Y., has filed a petition with the Public Service Commission, Second District, asking that its fare rate be fixed at 10 cents within local zones, and 20 cents on its through zones as they exist at present. The company also asks that unless the city of Troy waives a franchise restriction, the company be permitted to create a new zone or zones, including the territory within Troy, and that such rates be established within such zone or zones as may be "just and reasonable." The company has suffered a deficit from operations from 1914 up to July 1 of this year, of $420,671.65, of which $100,000 was incurred the first six months of this year. The company granted its motormen and conductors an increase in wages of 15 cents an hour on July 28, this increase being retroactive to July 1. The increase raised the wages from 41, 43 and 45 cents an hour, to 56, 58 and 60 cents an hour. The 15-cent increase will mean an additional expense to the company of $600,000 a year. The new agreement is limited to four months, which will make the expense to the company $200,000 up to Nov. 1.

Personal Mention

Veterans Honor General Harries

Brig.-Gen. George H. Harries, formerly president of the American Electric Railway Association, was elected commander-in-chief of the Military Order of the World War at the convention of that body at Detroit, Mich. General Harries recently resumed his duties as a vice-president of the Byllesby Engineering & Management Corporation, Chicago, Ill., after serving with distinction with the National Army in France and later as head of the American Commission which had charge of the repatriation of war prisoners.

General Harries' military career dates back to the frontier wars with the Indians, when he served as a scout under Generals Miles and Crook. In the Spanish-American War, as colonel of infantry volunteers, he participated in the siege of Santiago, Cuba. In the World War as brigadier general of the National Army he was in the thick of things at Verdun.

Later he served at Brest during the embarkation of troops for the return to the United States. He was then appointed American commissioner on the repatriation of allied prisoners of war, and was the first American to reach the goal coveted by the soldiers of all the allied nations. Nine months of distinguished service at Berlin during revolutionary turmoil brought to him decorations from several countries, including that of Commander of the Legion of Honor and the Distinguished Service Medal.

W. F. Anderson has been appointed auditor of the Manhattan & Queens Traction Corporation, New York, N. Y. Mr. Anderson is a graduate of Rensselaer Polytechnic Institute, Troy, N. Y. For several months he has been connected with the Doherty Training School for electric railway students at Toledo, Ohio. The New York & Queens Traction Corporation is one of the Doherty properties.

T. H. Mann, terminal freight agent for the Pacific Electric Railway, Los Angeles, Cal., has resigned. Mr. Mann plans to become associated with the Los Angeles office of a steamship company. He has been connected with the Pacific Electric Railway for more than twelve years. He was formerly employed by the old Los Angeles & Redondo Railway, which later became a part of the Pacific Electric Railway system.

Edward T. Moore, formerly vice-president and general manager of the Dallas (Tex.) Consolidated Street Railway, has been elected president and a director of the Simms Petroleum Company, New York, N. Y. Mr. Moore was manager of the Dallas traction system for fifteen years prior to the consolidation of the lines under the Strickland-Hobson management in April, 1917. Following this consolidation, Mr. Moore went to New York.

B. S. Hanchett Retires

Veteran Operator Resigns as President of the Grand Rapids Railway—Succeeded by B. C. Cobb

Thirty-seven years after taking up street railway work at Grand Rapids, Mich., Benjamin S. Hanchett has retired as president of the Grand Rapids Railway. B. C. Cobb, of the firm of Hodenpyl, Hardy & Company, investment bankers, and vice-president of the Grand Rapids Railway, has been elected Mr. Hanchett's successor. No change in the policy of the company is contemplated under the presidency of Mr. Cobb, who in addition to his duties as vice-president has been chairman of the operating committee of the railway for several years.

B. S. HANCHETT

Mr. Hanchett's retirement marks the close of a ten-year period during which he has successfully administered the railway's affairs as its president. Ill health and a desire to take a complete rest were responsible for his resignation. For the time being Mr. Hanchett will withdraw from public life and will take a long vacation in an endeavor to build up his health, which has not been rugged for several months.

Mr. Hanchett was born in 1869. At the age of fourteen years he entered the employ of the Grand Rapids horsecar system as an office boy. Soon thereafter he was promoted to the position of assistant book-keeper, and then to book-keeper. In 1888 he was made chief clerk of the company. Subsequently, he was made paymaster of the company and later was elected secretary. When the Valley City Street & Cable Railway purchased all the local lines in Grand Rapids and changed the motive power from horses to electricity, Mr. Hanchett was elected secretary and assistant treasurer of this company.

In 1900 the railways in Grand Rapids were taken over by the Grand Rapids Railway, and Mr. Hanchett was elected secretary-treasurer of the new company. In March, 1904, he was appointed general manager to succeed the late Hugh S. Johnson and was continued as secretary-treasurer of the company. The great growth of the system and the perfecting of the system were accomplished under Mr. Hanchett's management. He became president of the company in 1910.

Mr. Cobb, who succeeds Mr. Hanchett is president of the Northern Ohio Traction & Light Company., Akron, Ohio., and is also an official of a number of other traction and power properties throughout the country, representing Hodenpyl, Hardy & Company. Mr. Cobb was born in Boston, Mass., in 1870. He attended the Boston Latin School, and later went to Andover Academy. Mr. Cobb has been in public utility work for about twenty-four years. He began his career in the office of the Grand Rapids Gas Company in 1894. Four years later he became general superintendent of the Detroit (Mich.) Gas Company. Three years thereafter he left Detroit to become vice-president and general manager of the Saginaw-Bay City Railway & Lighting Company. In 1906 he became a member of Hodenpyl, Hardy & Company, with headquarters in New York City.

B. H. Hart, who has been superintendent of maintenance of way of the Texas Electric, Dallas, Tex., with headquarters in Sherman, Tex., has resigned to become superintendent of maintenance of way of the Gulf Coast Lines with headquarters at Kingsville.

Charles T. Doerr has been appointed purchasing agent of the Alabama Power Company, Birmingham, Ala. Mr. Doerr was formerly purchasing agent of the Birmingham Railway, Light and Power Company. Later he served with the Air Nitrates Corporation.

Orrin E. French has been appointed general assistant to P. F. Sheehan, manager of the Brockton Division of the Eastern Massachusetts Street Railway, Boston, Mass. Mr. French is a veteran employee of the Bay State system. Prior to his recent promotion he was foreman of the North Abington carhouse.

Irving S. Fairty, Assistant City Solicitor of Toronto, Ont., has been appointed solicitor to the Transportation Commission recently appointed by the Toronto City Council to take charge of the affairs of the Toronto Railway when the franchise expires in 1921. Mr. Fairty has been connected with the city's legal department since June, 1912.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Big Market for Car Seatings Anticipated

Seat Demand Light, but Good Orders for Repair Material—Steam Roads Expected to Buy Heavily

Manufacturers of car seats report only a fair volume of business at present. The buying of new seats is very small but orders for seating material, such as rattan, are fairly good. Many car builders are now making their own finished seats and this partly accounts for the light demand for that product. On the other hand, a growing volume of orders for bus seats is reported. Electric traction companies are buying seatings for repair purposes only as absolutely needed. Manufacturers say there is an increasing tendency to replace rattan material with slat seats. This is especially true regarding safety cars. Buying on the part of the steam roads has not developed heavily as yet. A big market is anticipated in that quarter as repairs to the seat equipment of steam roads have been at a low ebb. Some producers think it may still be some time before the influence of this buying is felt, but others are optimistic over the prospect of its appearance within the next two or three months. The needs of electric traction companies will be well taken care of in any case, it is said.

The buying of seating material by steam railroads is not expected to affect seriously the supply available for traction companies, it is stated. It may affect production, it is true, if manufacturing facilities should become almost entirely absorbed, but this is not thought to be probable. Furthermore, conditions of raw material in the two markets do not greatly overlap, as steam railroads mostly require plush and imitation leather for seats, while electric traction companies generally use rattan or wood.

MANUFACTURING CONDITIONS IMPROVING

Manufacturing conditions in general are improving at present. No fault is found with domestic labor conditions, though prices of native labor in the Far East, where the rattan is obtained, are said to be high compared with other years. Some manufacturers say rattan is scarce and that ship bottoms to transport the material are difficult to obtain. Other producers are not meeting with these difficulties. As a consequence, the condition of rattan seating material stocks varies considerably. Delivery conditions generally are said to be improving. On wooden seats manufacturers say there is no shortage. On the other hand, reports agree that the supply of plush and imitation and real leather is very low. To obtain deliveries by next spring on steel seats covered with this material, orders will have to be placed the latter part of this year. Deliveries cannot possibly be made under about four months, according to one large producer, and this figure runs up as long as six months. Deliveries of finished rattan and wooden slat seats range from four to eight weeks, while the rattan covering itself can be obtained from stock up to two or three weeks. No cancellations have been received.

One of the large manufacturers of this material says the price trend is upward and that higher quotations would not be surprising before long.

Transportation Holding Up Wood Tie Deliveries

Stocks at the Camps Good—Current Orders for Repair Work Only, but Heavier Demand Expected

Demand for wood ties is fairly good at present, but a much larger volume of orders is expected to develop soon, it is stated. This expectation is based on the estimated purchases which steam roads are expected to make. The buying movement from this quarter that was anticipated when the carriers received financial assistance in the form of rate increases has not as yet affected the tie market appreciably. Producers seem to be optimistic regarding the outlook, however.

Normal demand for railroad ties from all interests is about 100,000,000 to 125,000,000 annually, according to the United States Forest Service. During the war and the period of Federal supervision the carriers of the country reduced roadbed extensions and repairs to the level of absolute necessity. Tie purchases were therefore at a minimum. In 1918, according to the same source of information, purchases were slightly under 77,500,000 ties and in ten months of 1919 slightly over 84,500,000. Because of this curtailment in demand during the past few seasons producers are looking for a growing market in spite of present light orders. Buying on the part of electric traction companies is also rather light just now. Producers report that orders from electric railways are almost entirely for repair purposes.

A feature of the demand is the growing influx of Douglas fir ties into Middle Western and Eastern States, according to the Forest Service. These are regions which in the past have largely been supplied by oak cut along the right of way. The excessive cost and uncertainty of an adequate supply of such ties have brought about this change in the source of supply. On the whole, sales thus far this season have not been up to the normal standard of other years, according to representative producers. No cancellations have been received, however.

There are plenty of ties available at the tie camps, but a shortage of cars has made it largely impossible to market them. Shipments of pine ties as a rule can be made from stock, but deliveries are ranging in the neighborhood of two to four weeks. Many customers are specifying treated ties in their orders and this process adds about 75 to 80 cents to the cost of the tie. The creosote oil used in treating the wood is very scarce at present. About 30 to 40 per cent of the ties are now so treated, it is reported. Prices are holding steady, a standard 8 ft. x 6 in. x 8 in. yellow pine tie being quoted at about $2.80.

Favorable Conditions in Brake Shoe Production

Deliveries Are Good and Raw Material Situation Is Improved—Possibility of Higher Prices

Deliveries of brake shoes, according to information obtained from one of the leading producers in this line, are being made in good shape and are continuing to improve. Shipments of coal, coke, pig iron, etc., have been slow heretofore, but supplies are now arriving in better time as the freight situation continues to clear up. Raw material requirements of manufacturers are anticipated in advance and reserve stocks of material are kept on hand. This aids in maintaining the supply of the finished product.

The season has been a normal one as regards sales. Orders on behalf of new rolling stock have been a negligible factor in the business. Orders from electric traction companies are apparently being placed only as absolutely needed. The buying movement of steam railroads that has been anticipated since their recent rate increases does not seem to have made itself felt appreciably as yet. Manufacturers are optimistic regarding the future development of this business, however, though they seem to think it may be some time before the buying program of the carriers throughout the country, calling for expenditures of more than

$750,000,000, is put into operation. About a fourth of the total expenditures, it is estimated, will go for rolling stock, including repairs to existing equipment. No matter how large the orders that may develop in the future from steam roads, manufacturers state that they will be able to take care of the needs of electric traction companies.

Prices on brake shoes have held steady for the past two months. The price tendency, in the opinion of one of the prominent manufacturers, seems to point to further advances being made. This view, it is stated, is based on the prevailing high prices for such material as pig iron, coke and coal. The labor situation in this field is now reported satisfactory.

Definition of Utilities Entitled to Assigned Coal Cars

New Order Aims to Eliminate Abuses of System—Scope of Privilege Is Restricted

Public utilities which are entitled to receive assigned cars for their coal supply are defined by the Interstate Commerce Commission in a new service order. The new order has been worded in an effort to eliminate certain abuses alleged to have been taking place under the old order. It is claimed that assigned cars were being furnished to activities which could not be classed properly as public utilities.

Under the new order assigned cars are limited to those utilities which serve the general public directly under a franchise. When a utility is not owned by a public agency the application for a permit to obtain assigned cars must be approved by the Public Utilities Commission or the Railroad Commission of the state in which the plant is located. The text of a portion of the new order, which the Interstate Commerce Commission designated as Service Order No. 16, is as follows:

> It is ordered, That effective Sept. 19, 1920, and until further order of the commission, all common carriers by railroad within said territory to the extent that may be necessary in order that public utilities which directly serve the general public under a franchise therefor with street and interurban railways, electric power and light, gas, ice, water and sewer works; also ice plants which directly supply the public generally with ice; also hospitals, schools and other public institutions of the United States, state or municipal governments, may be kept supplied for current use but not for storage, exchange, or sale, be, and they are hereby, authorized to place, furnish and assign cars to coal mines for the transportation of such coal in addition to and without regard to the existing ratings and distributive shares for mines upon said railroads; provided, no cars shall be so placed, furnished or supplied by any such carriers without written application therefor, showing that such coal is needed solely for the current use of the applicant and not for storage, exchange, or sale, in order that applicant may continue its public service in daily operation, which application, in the case of public utilities not owned by some governmental agency, shall be approved by the public service commission or railroad commission of the state in which said plant is located if there be one, and all such applications shall be concurred in by the delivering railroad; and provided, further, that such coal shall not be subject to reconsignment except to public utilities or public institutions as above described, and that a written report of the cars placed hereunder shall be made to the Interstate Commerce Commission by the railroad placing the cars as often as once each week.

New One-Man Car Manufacturer

Theodore A. Brewster, former chief draughtsman and engineer for the St. Louis Car Company, has announced the organization of the Missouri Car Company, a $500,000 corporation, which plans to manufacture one-man street cars. The company, according to Mr. Brewster, will purchase ten acres in the new industrial district in North St. Louis and within the next two or three months will start construction of the first of five units of its manufacturing plants. The first plant will cost about $250,000 and will employ 500 people. This plant, with a capacity of 600 to 800 cars a year, will be completed in eight or ten months, it is stated, and the first cars will be on the market in less than a year. The car to be manufactured will weigh 14,000 lb. A patented truck claimed to eliminate swinging and jolting has been purchased. The officers of the new company are: T. A. Brewster, president; J. J. O'Brien, vice-president and treasurer, and G. Elmo Holke, secretary. The company will have its offices in the Central National Bank Building, St. Louis.

Issue of $1,090,000 in Notes to Pay for 139 New Cars

Milwaukee (Wis.) Electric Railway & Light Company has sold an issue of $1,090,000 ten-year 8 per cent sinking fund equipment trust gold certificates at par and interest through W. A. Read & Company. The notes are dated Oct. 1, 1920, and are issued under the Philadelphia plan against 139 new standard steel street railway cars. The cost of these will be $1,560,000. An initial payment of $470,000 has been made by the company. At the time of going to press the certificates were quoted at $101.

Rolling Stock

Havana Electric Railway, Light & Power Company, Havana, Cuba, announces that it expects to purchase twenty or more 6-yard steel dump cars for coal and construction materials.

Brockton & Plymouth Street Railway, Plymouth, Mass., is reported to have ordered four more safety cars. At least one new snowplow will also be purchased, it is reported.

Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y., in its application to the Public Service Commission for authority to issue new bonds for extensions and improvements, has included seven safety cars in the contemplated additions.

Empire State Railroad Corporation, Syracuse, N. Y., has asked the Public Service Commission for the Second District for authority to issue $70,000 in equipment trust notes to enable the company to purchase three new interurban cars, one double-truck snow sweeper and one double-truck snowplow.

Burlington (Iowa) Railway & Light Company will replace the fifteen cars now in use on the system with Birney type safety cars. Six of the safety cars were expected to be put into operation the latter part of this month and these will be followed by nine others, it is reported. Delivery of the new cars, which were built in St. Louis, was promised in August, but shipment was delayed.

Franchises

Knoxville Railway & Light Company, Knoxville, Tenn.—The Knoxville Railway & Light Company has received a franchise to enlarge its system by constructing new and additional tracks on Wall Avenue, Broadway and Fifth Avenue, Walnut Street and Asylum Avenue. Reference to the plans of the company for these improvements was made in the ELECTRIC RAILWAY JOURNAL recently.

Track and Roadway

Trinidad Electric Transmission Railway & Gas Company, Trinidad, Col.—The Public Utilities Commission of Colorado has refused a permit to the Trinidad Electric Transmission Railway & Gas Company to remove its tracks on Pine Street from State to San Juan Street.

Pacific Electric Railway, Los Angeles, Cal.—The State Railroad Commission has approved changes in the trackage of the Pacific Electric Railway in Long Beach. The relocation of the tracks and the construction of crossings at grade over the Southern Pacific and the San Pedro branch of the Los Angeles & Salt Lake Railroad were made necessary by the construction of the flood control channel by the Los Angeles County Flood Control District.

Brockton & Plymouth Street Railway, Plymouth, Mass.—The Brockton & Plymouth Street Railway has started upon plans for a new power house to be located in Kingston.

Springfield (Mass.) Street Railway.—The Springfield Street Railway is starting to lay double track on Front Street. The road is being torn up and the work is being hurried to completion. Permission to lay this double track was granted the Springfield Street Railway some time ago.

Eastern Massachusetts Street Railway, Boston, Mass.—If the City Council of Chelsea acts favorably on the petition of the Eastern Massachusetts Street Railway for the establishment of a prepayment area in Chelsea Square, the company will start at once on the construction of a station in the square. The station plans show a platform 35 ft. x 80 ft. This station will be used as a transfer point and all traffic from the north will make a stop at Chelsea Square, the passengers transferring to cars for Boston. The cost of this undertaking will be more than $100,000.

Syracuse & Suburban Railroad, Syracuse, N. Y.—The Public Service Commission, Second District, under an order issued Sept. 3 has directed the Syracuse & Suburban Railroad to reconstruct its track in Genesee Street in Fayetteville and locate it in the center of the street and conform to the new grade. Rails and ties to be used shall be subject to the approval of the commission, the company to submit within fifteen days specifications covering the rails and ties. The company is to notify the commission in ten days whether the order will be obeyed. Fayetteville trustees asked for an order requiring rebuilding of the tracks and their removal to the center of Genesee Street, the road now being located on the northerly side of Genesee Street, in part. Genesee Street is a part of the state highway system and its improvement is under way and the change to the railroad tracks is in connection with the paving operations. Reference to the action of the Fayetteville trustees was made in the ELECTRIC RAILWAY JOURNAL for Sept. 4.

Poughkeepsie & Wappingers Falls Railway, Poughkeepsie, N. Y.—In an application to the Public Service Commission for the Second District to issue $243,000 of bonds, the Poughkeepsie & Wappingers Falls Railway outlines a new construction program. This plan includes the laying of double tracks with concrete pavement, ballast and steel ties between the carhouse and Cherry Street, about 381 ft., and between the east side of Cherry Street on Main Street to Grand Avenue about 3,600 ft. Single track will be replaced on Main Street between Grand Avenue city line and the Arlington switch with tee rail, rock ballast and ties. Overhead trolley equipment will be reconstructed in Main and other streets. The company will also repair its distribution system on Main Street, River to White and on the north side install ties and raise tracks with cinder ballast in Grand Avenue, College Avenue to Driving Park. New ties will also be installed between Lynch's and Allendale.

Cleburne, Tex.—Business men of Fort Worth have shown interest in the proposed interurban line from Cleburne extending westward into the West Texas oil fields, and it is indicated that the Fort Worth Chamber of Commerce may undertake to aid in the financing of the project. Present plans call for an interurban line originating at Cleburne, where a junction will be made with the Fort Worth-Cleburne line of the Tarrant County Traction Company, thence extending westward, touching Glen Rose, Stephenville, Lingleville, Gorman, Hico, Dublin, Cisco, Desdemona and other oil field towns. Several meetings have been held in various towns along the proposed route, and the preliminary work looking to the raising of a fund of $1,500,000 is already under way. In the Jan. 3 issue of the ELECTRIC RAILWAY JOURNAL a reference to this proposal was made and again in the June 19 issue reference was made to the election of a chairman of the Cleburne Interurban Association.

Power Houses, Shops and Buildings

Public Service Railway, Trenton, N. J.—Thomas N. McCarter, president of the Public Service Railway, Newark, N. J., has announced that the contract for the erection of a trolley terminal at the Federal Street ferry, Camden, N. J., has been signed. Mr. McCarter says there will be two trolley approaches from Delaware Avenue. The cars will discharge the passengers when entering the terminal, turn a loop and run to a loading platform. There will also be an extra spur track for car shortage to meet rush-hour needs. The new terminal will do away with the "bull pen" now used by the trolley company at that point.

Bryan & College Interurban Railway, Bryan, Tex.—The Bryan & College Interurban Railway will purchase current from the city of Bryan for the operation of its cars at 4 cents to 5 cents per kilowatt-hour, according to amount of current used.

Trade Notes

National Association of Railroad Tie Producers will hold its third annual meeting in San Francisco on Jan. 27 and 28, 1921.

The Flexible Steel Lacing Company, manufacturer of Flexco lamp guards, Flexco-Lok lamp guards, alligator steel belt lacing, etc., is now in its new factory at 4607-4631 Lexington Street, Chicago, Ill.

The American Wood Preservers' Association has set the dates of Jan. 25, 26 and 27, 1921, for its seventeenth annual meeting, to be held in San Francisco after convening with the engineers of southern California in Los Angeles on Jan. 24.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., announces that a special stockholders' meeting will be held at the East Pittsburgh office on Nov. 18, for the purpose of considering an increase in capital stock from $75,000,000 to $125,000,000 and increasing the company's indebtedness by $30,000,000.

Dwight P. Robinson & Company, with which is consolidated the former corporation, Westinghouse, Church, Kerr & Company, has announced the appointment of Carl C. Thomas as Western representative, with offices in the Electric Equipment Building, Los Angeles, Cal. Mr. Thomas was formerly professor of mechanical engineering at the Johns Hopkins University, Baltimore, Md.

J. H. Cain, formerly with the Shore Line Electric Railway, Norwich, Comm., has become connected with the Railway Audit & Inspection Company, Philadelphia, Pa. He will serve as the general representative for New York State and New England.

Greene, Tweed & Company announce arrangements to manufacture their line of automatic lubricators in their new plant at Newark, N. J. In the future all shipments will be made from there and all repairing will be done there instead of at 109 Duane Street, New York, as formerly.

National Association of Purchasing Agents, which will hold its annual convention at Chicago on Oct. 11, 12 and 13, announces that the program of its standardization conference, which will be held at the same place on Oct. 9, will include discussion of standardization of catalogs, invoices and shafting sizes and pricing on the decimal system.

The Roller - Smith Company, 233 Broadway, New York City, announces that its Philadelphia representative, the Perkins-LeNoir Company, has added to its sales force G. C. Unger. He will devote his attention to the various lines of electrical and control apparatus handled by the Perkins-LeNoir Company and will specialize in the Roller-Smith products.

Charles E. Patterson, comptroller of the General Electric Company, has been elected vice-president of the company. Mr. Patterson was previously associated with the New York Central Railroad and the American Locomotive Company. He aided in the development of the Interstate Commerce Commission's accounting system for railways, and was appointed chairman of the standing committee of the Electrical Manufacturers' Council which evolved the standard accounting cost system for the electrical manufacturing industry. In 1901 he became comptroller of the American Locomotive Company. In 1909 he joined the General Electric Company for the purpose of introducing a modern accounting system. In 1913 he was elected comptroller of the company. Mr. Patterson was born in 1866. He will still retain the title of comptroller of the General Electric Company, acting as vice-president in charge of accounting.

New Advertising Literature

Instruments.—The General Electric Company, Schenectady, N. Y., has issued bulletin No. 46,017, to supersede bulletin No. 4,879, on direct-current instruments.

Ammeters and Voltmeters. — The Roller-Smith Company, 233 Broadway, New York City, has recently issue bulletin No. 430, covering its direct-current switchboard-type voltmeters and ammeters; also bulletin No. 450, describing its alternating-current switchboard-type voltmeters and ammeters.

Condulets.—The Crouse-Hinds Company, Syracuse, N. Y., has recently issued a new bulletin on condulets for steam and electric railroads, for car wiring, locomotive wiring, signal-tower battery charging, etc.

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Rush Hour to the Chief Engineer means 75 to 125 per cent overload for two to three hours.

To the Superintendent of Transportation, it means more cars, shorter headways and greater liability of accidents.

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Has he provided insurance for his safeties on the heavy grade?

Peak load power is absolutely necessary to propel cars.

Type "G" Peacock brakes are absolutely necessary to permit peak load operation with perfect safety.

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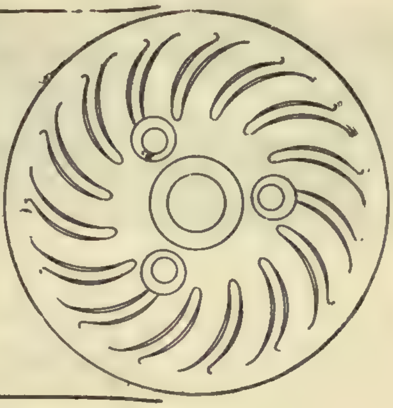

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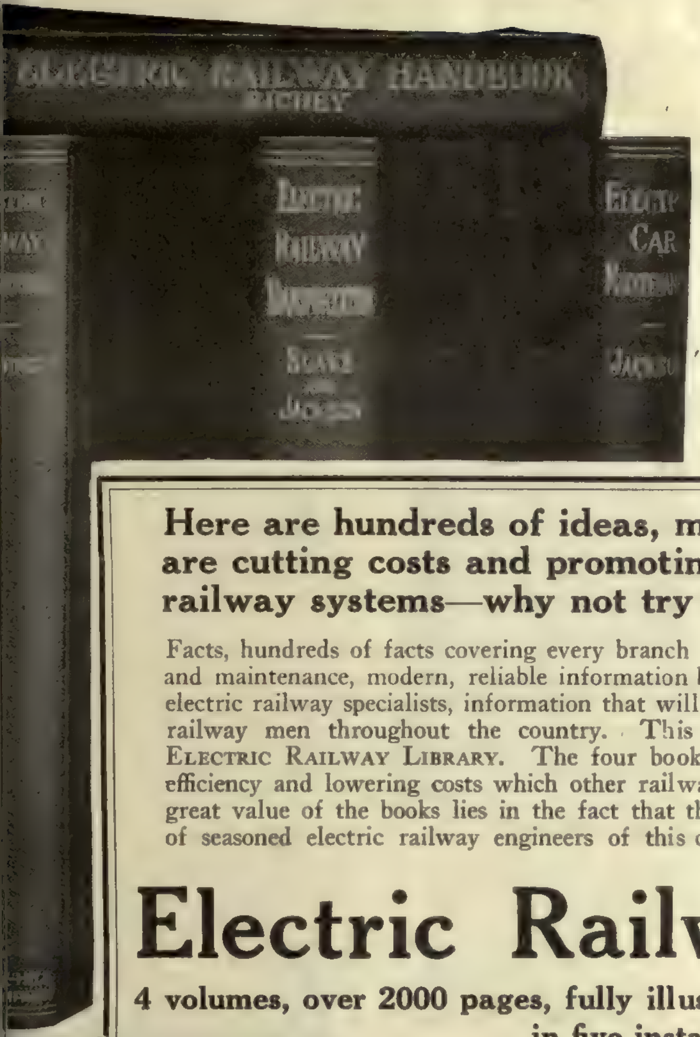

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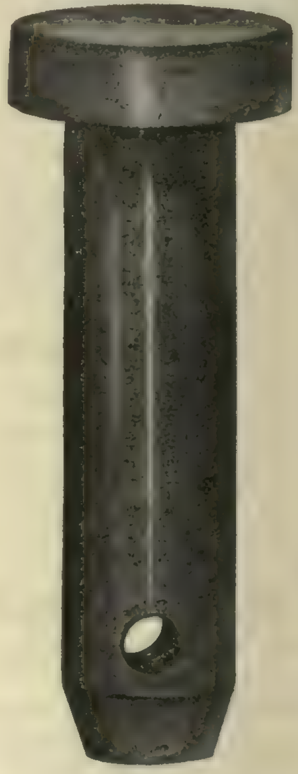

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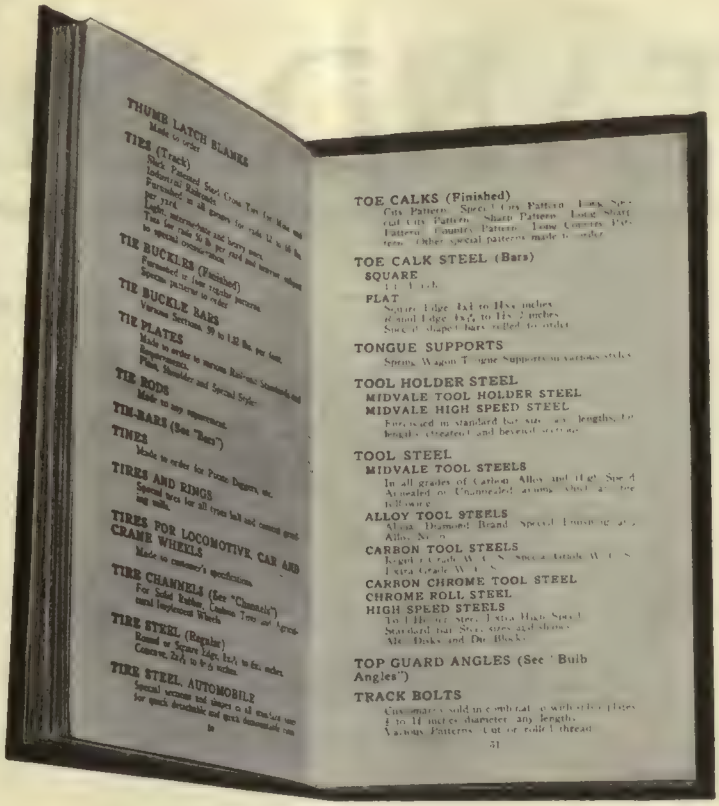

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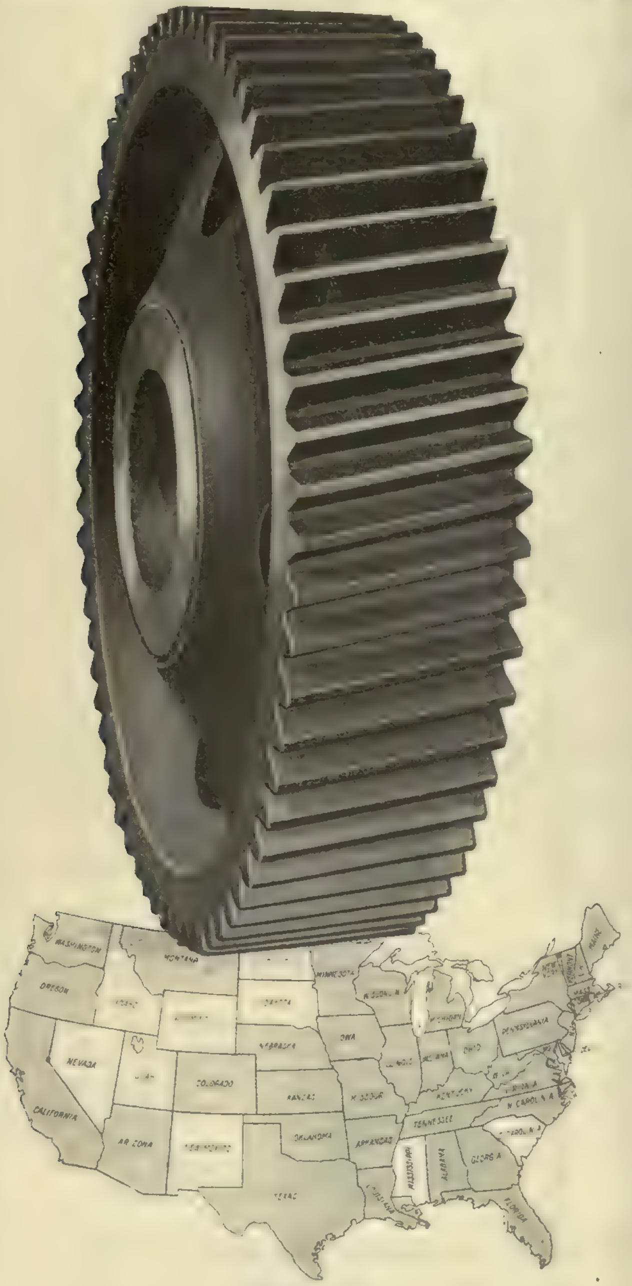

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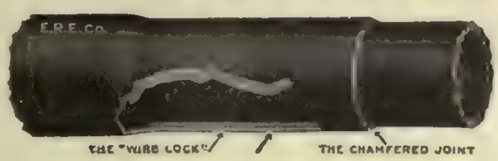

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   c. Transverse loads on wires for various wind velocities.
   d. Clearances necessary to determine the minimum length of pole.
   e. Physical properties of wires and cables.
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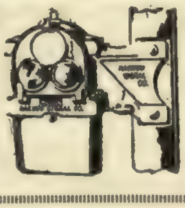

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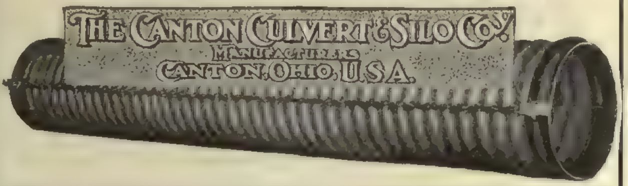

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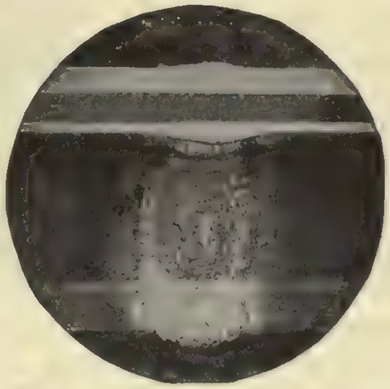

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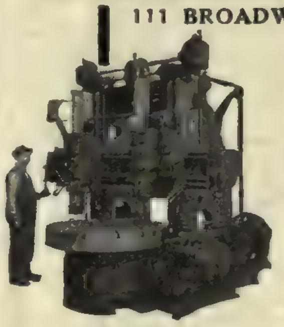

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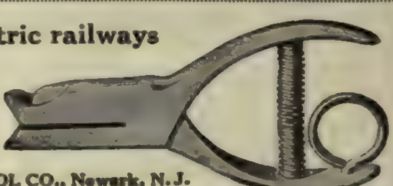

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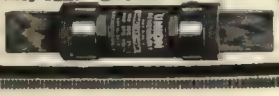

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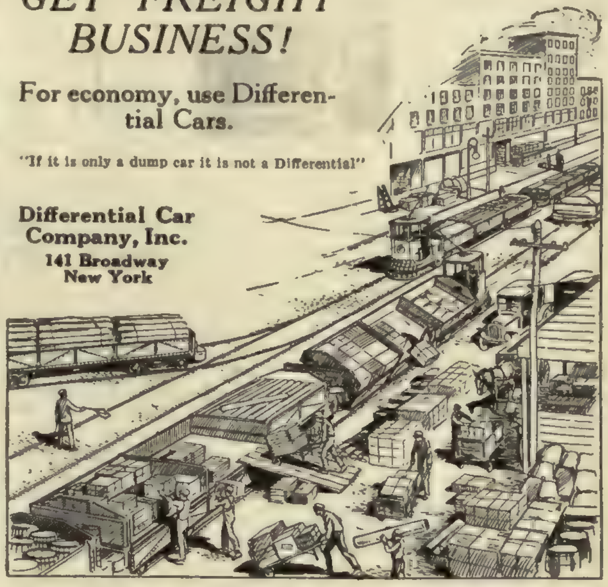

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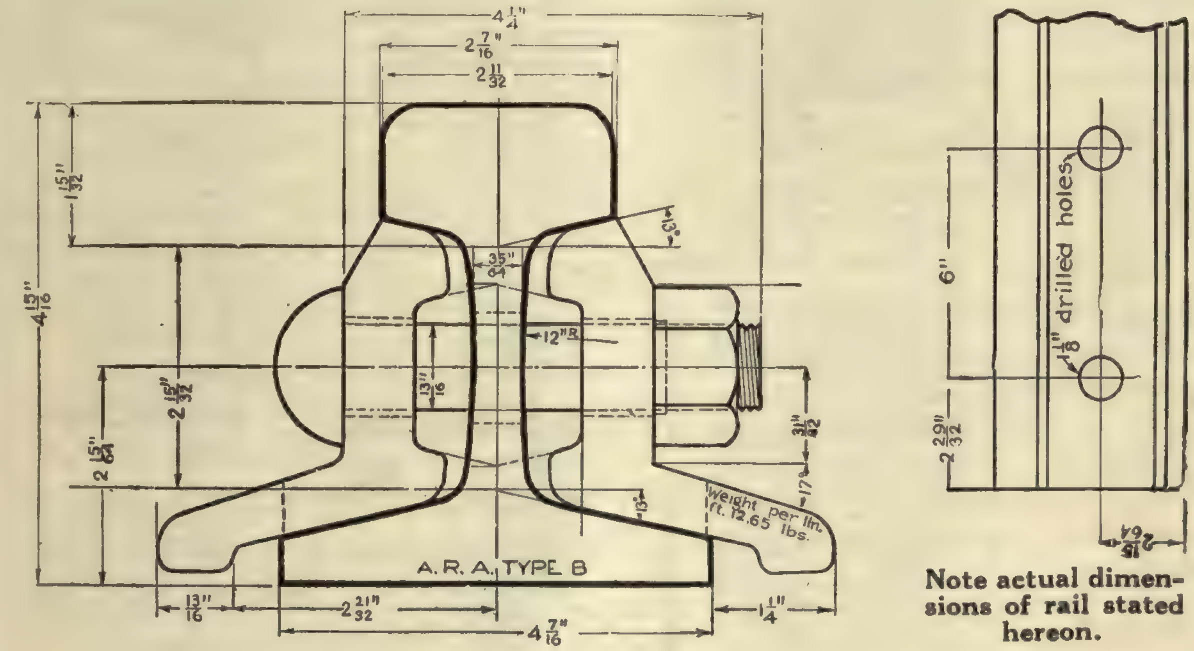

Note actual dimensions of rail stated hereon.

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Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
Green Engineering Company

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St. Louis Car Co.

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Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

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More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

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Electric Service Supplies Co.
International Register Co., The

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Johns-Manville Co., H. W.

Batteries, Storage
Electric Storage Battery Co.

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Westinghouse Elec. & Mfg. Co.

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Stucki Co., A.

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Ohio Brass Co.
Rail Welding & Bonding Co.

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Electric Railway Improvement Co.
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St. Louis Car Co.
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Bushings, Graphite and Wooden
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Westinghouse Elec. & Mfg. Co.

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Ohio Brass Co.

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General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.

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Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

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International Register Co., The
Roebling's Sons Co., John A.
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Samson Cordage Works
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Brill Co., The J. G.
Ohio Brass Co.
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Crossing Foundations
International Steel Tie Co.

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Crossings, Track (See Track, Special Work)

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Wish Service, P. Edward

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General Electric Co.

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National Pneumatic Co., Inc.

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Ingersoll-Rand Co.

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Chicago Pneumatic Tool Co.
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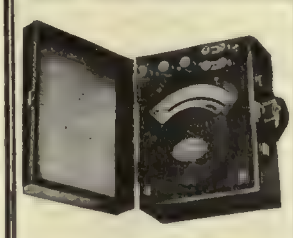

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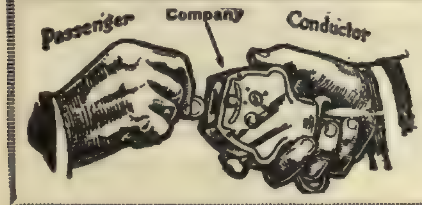

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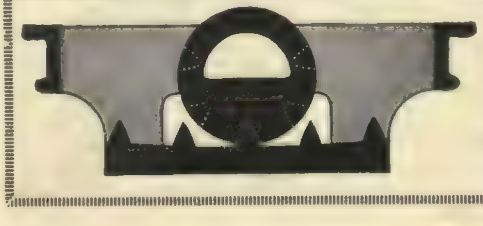

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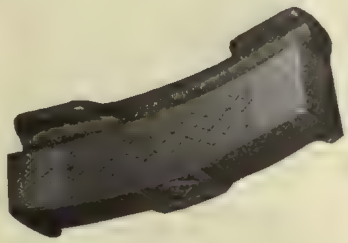

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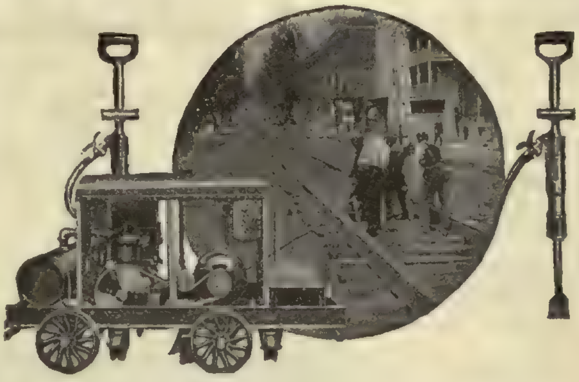

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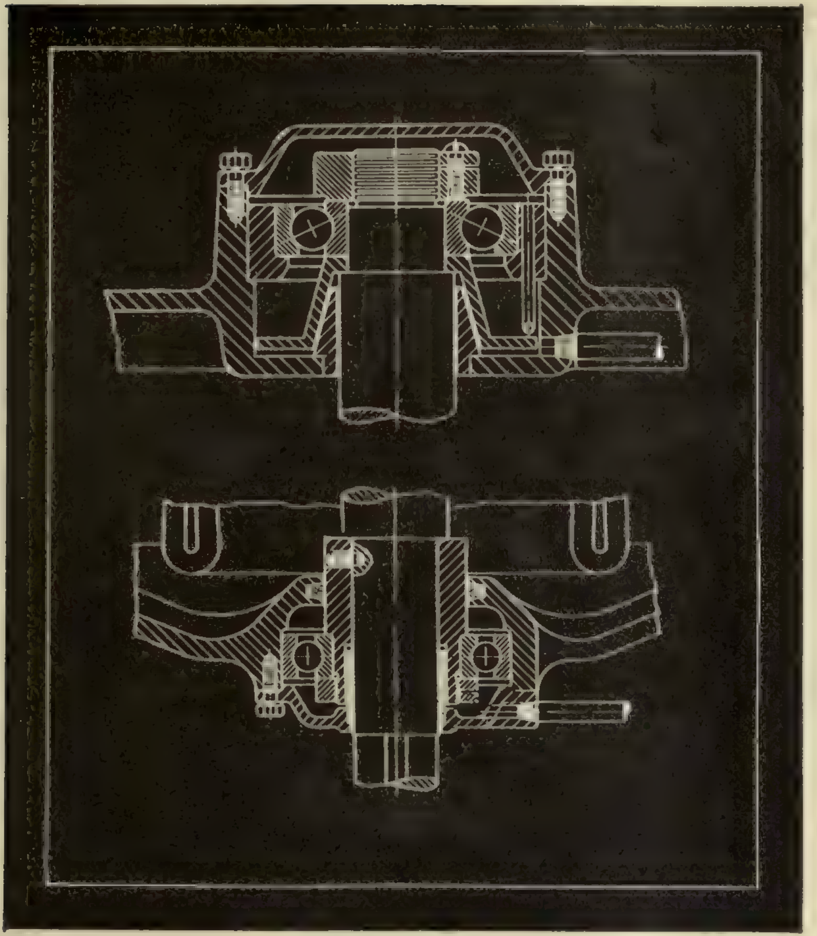

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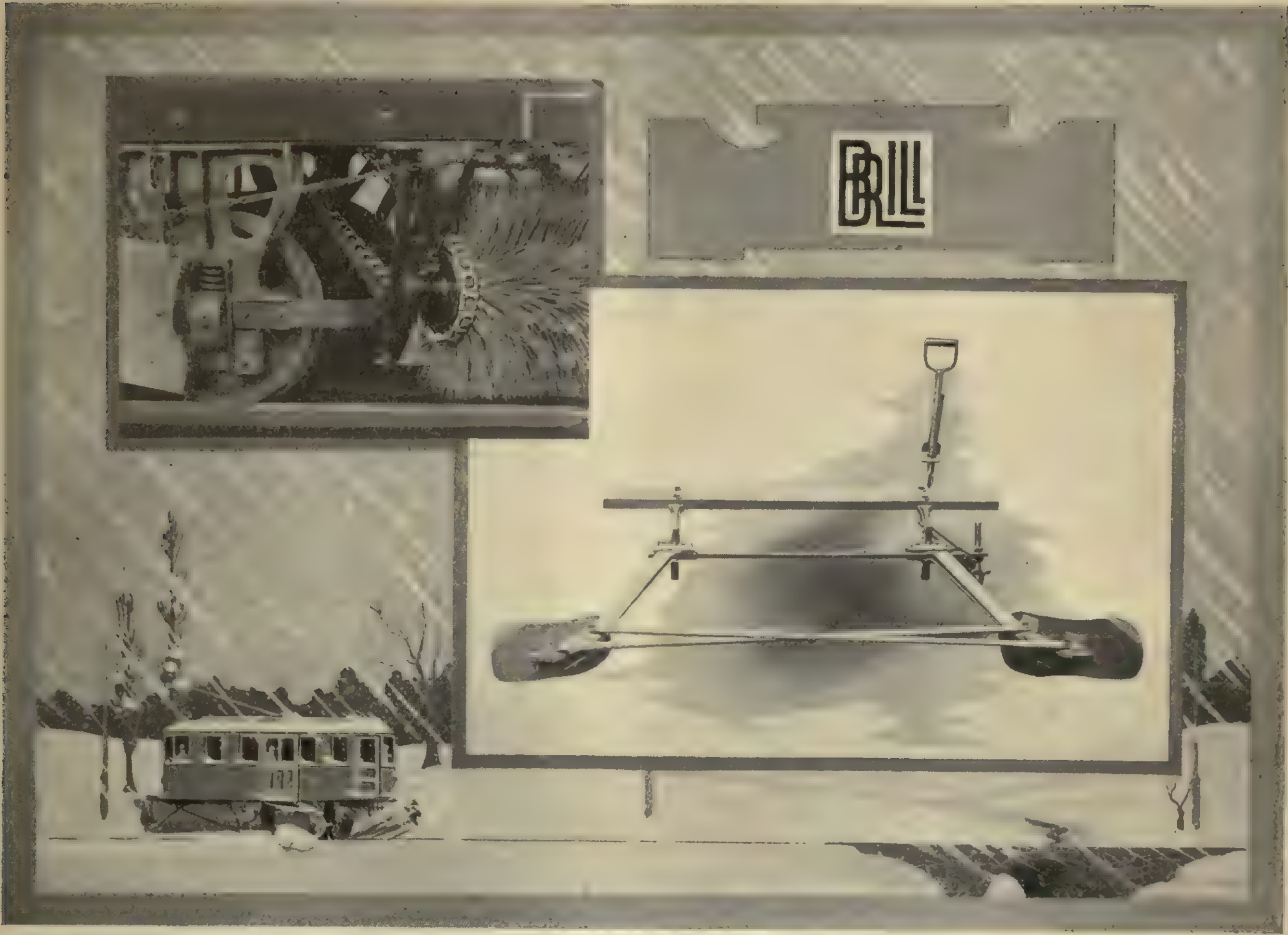
6712 Cornell Ave., Chicago, Ill.

TOOLS

- Armature and axle straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil tapping machines for armature leads
- Coil winding machines
- Pinion Pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, Door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resisters
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels



For the Winter's Snow

You may need new sprocket chains for your snow sweepers, or some other equally important part of your snow fighting equipment. It will pay you to order now before the winter's snow comes.

Brill sprocket chains have malleable rollers and drop-forged links. They are strongly put together, and will last.

The cars equipped with Brill Track Scrapers illustrated will maintain their schedules during light snows without assistance from the sweepers; consequently, they save money by removing the necessity for sweeper operation.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. ST. LOUIS MO. — G. C. KUHLMAN CAR CO CLEVELAND, OHIO — WASON MANF'G CO. SPRINGFIELD, MASS.

The New Versus The Old

Electrification has increased the capacity of a single-track line over the Continental Divide almost 50 per cent.

Electrification eliminates delays due to taking on water and coal, freezing of locomotives and reduction of tonnage inseparable to steam locomotive operation in cold weather.

Electrification has effected the replacement of 112 steam locomotives by forty-two electric locomotives on the Chicago, Milwaukee and St. Paul Railway.

Electrification will save more than 50% of the total amount of coal now burned on our steam locomotives. This saving is more than 12% of the total annual Bituminous coal production of the United States.

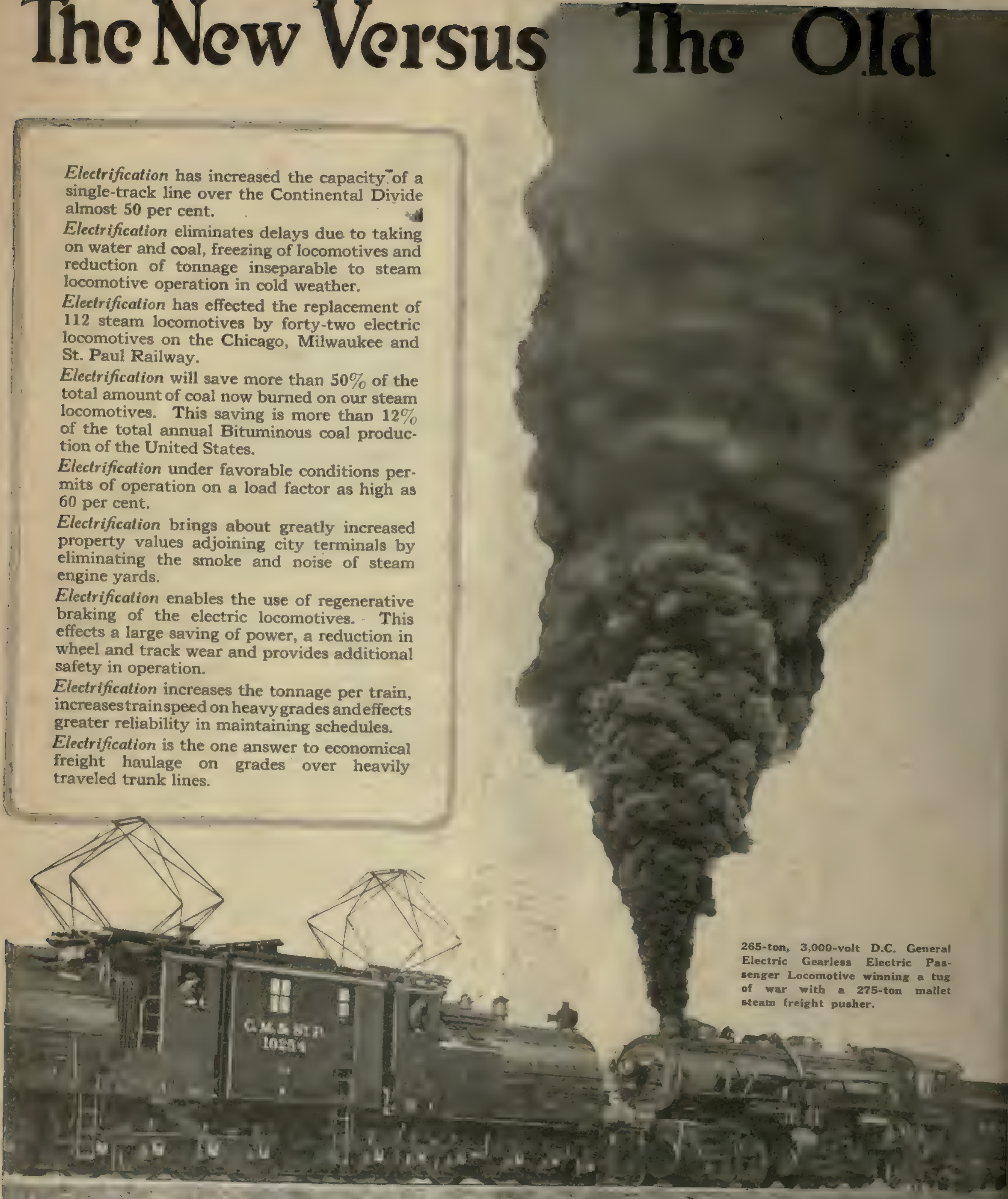
Electrification under favorable conditions permits of operation on a load factor as high as 60 per cent.

Electrification brings about greatly increased property values adjoining city terminals by eliminating the smoke and noise of steam engine yards.

Electrification enables the use of regenerative braking of the electric locomotives. This effects a large saving of power, a reduction in wheel and track wear and provides additional safety in operation.

Electrification increases the tonnage per train, increases train speed on heavy grades and effects greater reliability in maintaining schedules.

Electrification is the one answer to economical freight haulage on grades over heavily traveled trunk lines.



265-ton, 3,000-volt D.C. General Electric Gearless Electric Passenger Locomotive winning a tug of war with a 275-ton mallet steam freight pusher.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

25-77

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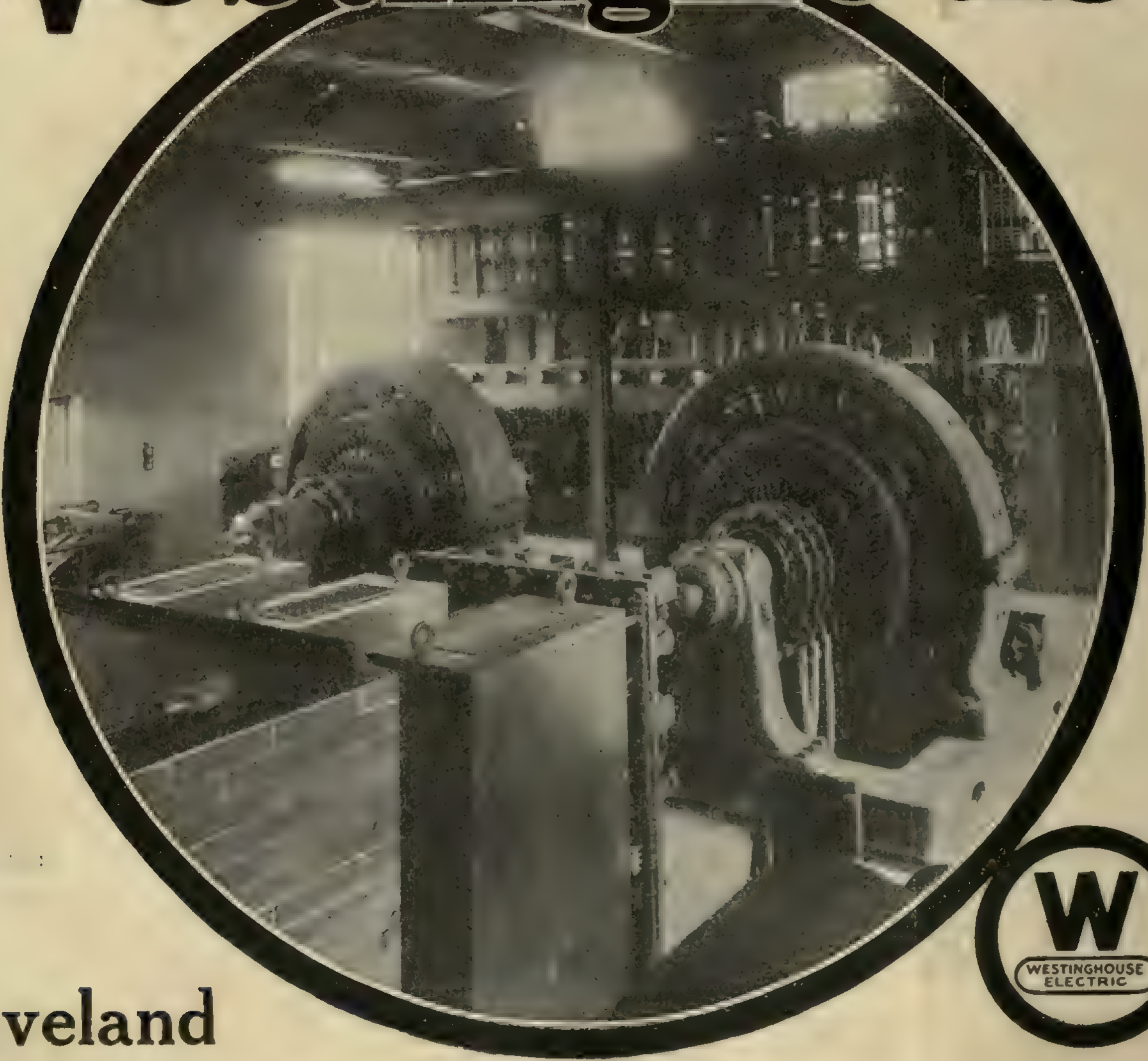
Annual Convention Number

ELECTRIC RAILWAY JOURNAL

Mass Transportation at the Golden Gate is dependent upon the strong, ductile and even wearing quality of Phono-Electric Trolley Wire which has been accepted as the logical choice for uninterrupted service, whether that service be on city, interurban or electrified steam lines.

Bridgeport Brass Company
Bridgeport Connecticut

Westinghouse



Cleveland

Largest Full-Automatic Substation in the World

To Cleveland and the Cleveland Railways Company goes the distinction of having the largest full-automatic substation in the world.

To Westinghouse goes the distinction of having played an important part in designing and manufacturing the huge apparatus for this station. The station contains two 1500 kw. Westinghouse converters, each equipped with the proper transformer and automatic control equipment and is the first of several such stations to be put into operation.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.
Sales Offices in All Large American Cities

Vol. 56, No. 14 New York, October 2, 1920 *Pages 627-698*

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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Mass Transportation Number

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Strike Demonstrates Need for Rerouting.
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BROOKLYN

·BRIDGEPORT

Successful Mass Transportation

Successful Mass Transportation depends largely on the selection of the right equipment for the service in which it is to be used, coupled with a thorough, reliable system of inspection and maintenance.

Whether or not the Safety Car, the Peter Witt, the low-level car or some other type, best suits the need of your property cannot be easily determined. There are so many factors to consider. In this connection Westinghouse engineers stand ready and will gladly give any assistance requested by railway executives and engineers.

BOSTON

BALTIMORE

Quicker Service—Lower Costs

Electric Railways must give frequent, reliable service. This is vital as the public generally demand higher scheduled speeds. Equip your cars with Westinghouse HL control and motors This insures reliable service at lower cost.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

W
WESTINGHOUSE ELECTRIC

TAMPA, FLA.

WESTINGHOUSE EQUIPPED SAFETY CARS

Westinghouse

CEDAR RAPIDS

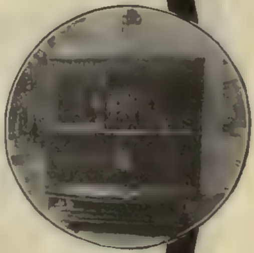
RICHMOND, VA.

The Safety Car—Car-in-sight service, the solution on many systems

Fast schedules and frequent service with the small light-weight safety car is the acknowledged solution for many properties both in small and in large cities.

Car-in-sight service with small light-weight cars has come to stay. It attracts new business; largely increases revenue; lowers power cost; and reduces the platform expense. With lighter equipment, the maintenance of the right-of-way is a minimum. The durability of modern electrical equipment insures appreciable reduction in car and equipment cost.

PHILADELPHIA

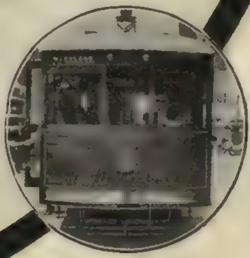


TACOMA

Westinghouse No. 508 Motors

During 1914, the Westinghouse Electric & Manufacturing Co. recognized the general utility of this type of car and developed and built the first small motor for one-man cars which were installed by the City Electric Company, Albuquerque, New Mexico. Since that time, thousands have been built and are now in successful safety-car operation in both large or small cities from coast to coast as the illustrations on the accompanying pages indicate.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.



SEATTLE

LOS ANGELES

WESTINGHOUSE ELECTRIC

ARE A SUCCESS FROM COAST TO COAST

Westinghouse

WESTINGHOUSE ELECTRIC

Westinghouse

City Cars equipped with No. 514 Motors and HL Control—Boston City Cars

Westinghouse Motors and Control for Heavy Duty Double Truck Cars in City Service

Two Car City Train equipped with No. 306 Motors and HL Control. Milwaukee, Wis.

The reliable performance of Westinghouse HL control has given a marked impetus to multiple-unit-train operation in a great many cities throughout the Country. Railway operators generally agree that with this form of equipment, mass transportation is accomplished with greater dispatch,—far greater flexibility, more reliable schedules, and better balanced motor power than with any other combination. However, under some conditions, trailer operation meets the requirements notwithstanding its known handicaps.

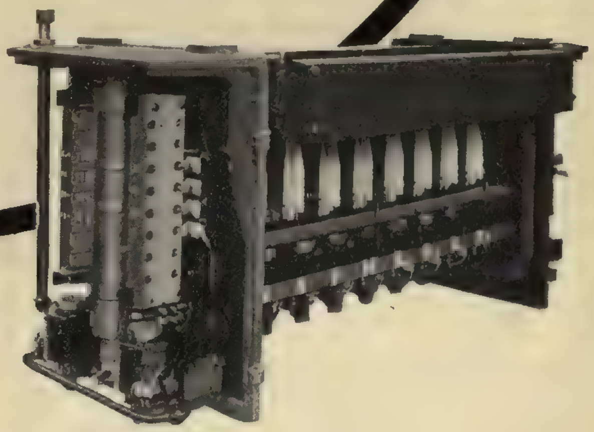
The Westinghouse Electric Company has established Standard HL control for all types of cars; and has nine standard sizes of railway motors. These cover all requirements from the light-weight Safety Car up to the Subway and High-Speed Interurban. They are: No. 508, 25 H.P.; No. 514, 40 H.P.; No. 532, 50 H.P.; No. 306-CV-4, 65 H.P.; No. 548-C, 100 H.P.; No. 333-V, 125 H.P.; No. 557-A, 140 H.P.; No. 567-A; 165 H.P.; and No. 577-A, 190 H.P.

The No. 508 for safety cars; the No. 514 for moderate-weight, double-truck cars; the No. 532, for large double-truck cars; the No. 306-CV-4, for heavy-duty urban and suburban traffic. In each of the foregoing motors, the A.E.R.A. standards are strictly adhered to. Among the recent large purchasers of these types of motors are:

Boston Elevated Railway; Philadelphia Rapid Transit; United Railways of Baltimore; Northern Ohio Traction; Capital Traction; Birmingham Railways & Light; Kansas City Railways; Third Avenue Railways; Cincinnati Traction; Wheeling Traction.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

No. 514C, 40 Hp.



HL Control

Westinghouse

Freight Car equipped with No. 333 Motors and HL Control.

High Speed Interurban

The service conditions imposed, unusually severe, require the very best interurban equipment that can be provided. Winter storms, sleet and an exceedingly heavy traffic demand equipment of extreme durability. Westinghouse No. 557 motors and HLF control as used on the Chicago, North Shore and Milwaukee Electric R.R. or Westinghouse No. 306 motors with HL control as used on the Monongahela Valley Traction Co. are both highly recommended, depending upon service conditions. Both are justified by the satisfactory service which they performed.

Package Freight

Although not a new field, its development is going forward rapidly. The recent increase in freight rates should cause great activity in this branch of the electric railway industry.

Of the many roads using Westinghouse Equipment for this service, are the following: Empire United; Michigan Railway; Northern Ohio Traction; Philadelphia Rapid Transit; Hagerstown & Frederick; Detroit United; Ohio Electric; Pacific Electric; Maryland Electric; Washington & Old Dominion; Waterloo, Cedar Falls & Northern; Chicago, North Shore and Milwaukee.

W
WESTINGHOUSE ELECTRIC

Westinghouse

Steam Railroad Electrification

An epoch-marking event occurred upon the opening of the new electrified zone of the Chicago, Milwaukee & St. Paul trans-continental line across the Cascade Mountains between Othello, Washington, and Tacoma and Seattle, Washington. Westinghouse substation apparatus of the most modern design, equipped with specially designed flash suppressing devices, supply a large portion of the 3000-volt, D.C. current for this extension. In addition, ten Baldwin-Westinghouse, 280-ton passenger locomotives of 4000 hp. each, designed to haul 12-car Pullman trains over the mountain ranges, were delivered within the past year.

Recent orders for electric locomotives include five passenger locomotives for the New York, New Haven & Hartford R.R. two for the Boston & Maine; four for the Paulista Electrification in Brazil, and a number to other foreign countries.

Baldwin-Westinghouse Locomotives

Baldwin-Westinghouse standard locomotives, 25-ton, 40-ton, 50-ton and 60-ton—meet all requirements of Interurban freight haulage. Over 50 roads are now using Standard Baldwin-Westinghouse locomotives. Their inherent advantages have made them valuable revenue builders wherever they are in operation.

Baldwin-Westinghouse Electric Locomotive equipped with No. 562 Motors and HLF Control.

Address either company,

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Westinghouse

Two of the new 250 Safety Cars recently purchased by the Eastern Massachusetts (Bay State) Street Ry., all of which carry "Bungalow" air compressors.

"Bungalow" Type Air Compressor

250 "Bungalow" air compressors selected by Largest Electric Railway Line

All the largest orders for Safety Cars include the "Bungalow" air compressor —Brooklyn, 200; Eastern Massachusetts, 250; Public Service Corpoation of New Jersey, 200. The highly satisfactory service rendered by this dependable machine resulted in its selection.

Its light weight, low build, compact and rugged form—and above all, its absolute dependability, recommends the "Bungalow" to exacting electric railway service.

Not only the large systems select the "Bungalow," but many smaller ones as well. The "Bungalow" is installed on 3306 Safety Cars operating on 185 different electric railways in the United States.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

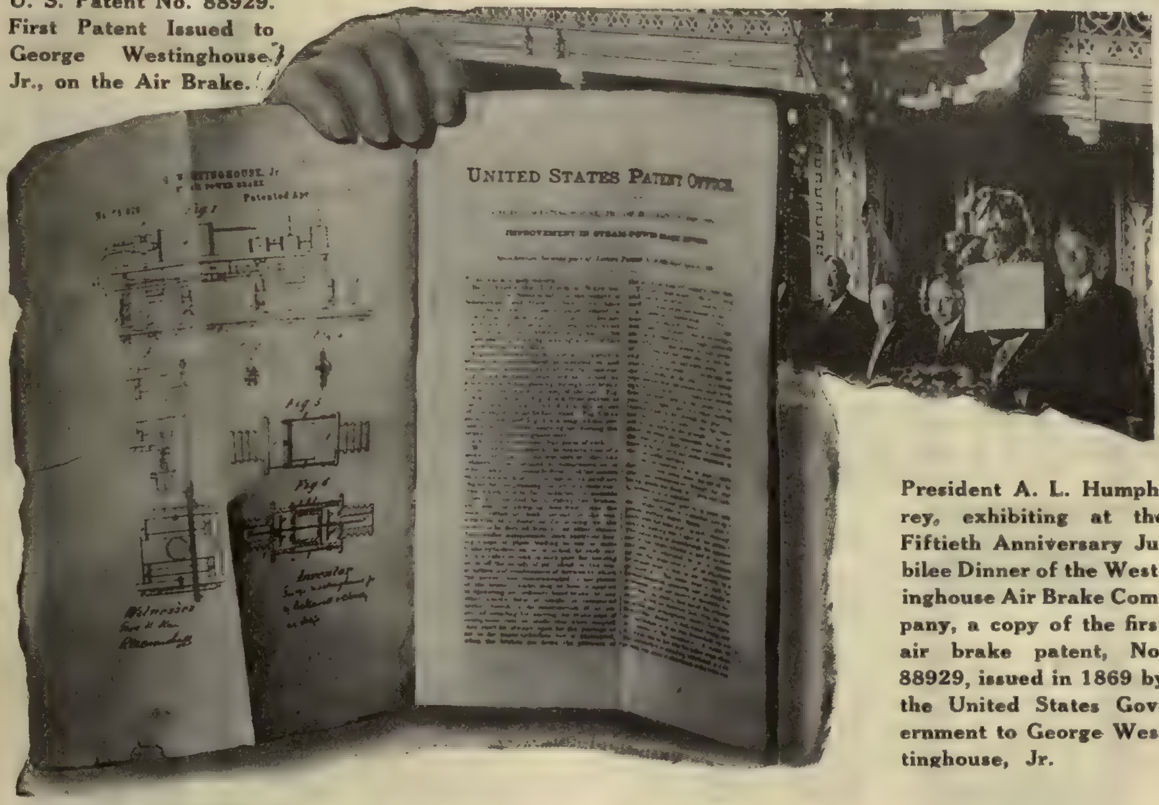
TRADE MARK

New York
San Francisco

Washington

Chicago
St. Louis

U. S. Patent No. 88929. First Patent Issued to George Westinghouse, Jr., on the Air Brake.



President A. L. Humphrey, exhibiting at the Fiftieth Anniversary Jubilee Dinner of the Westinghouse Air Brake Company, a copy of the first air brake patent, No. 88929, issued in 1869 by the United States Government to George Westinghouse, Jr.

The First Patent—The Air Brake and the beginning of Modern Railroad Transportation

The year 1869 was a momentous one. In that year Geo. Westinghouse, Jr., was granted his first air brake patent. Simultaneously modern railway transportation was born. The prevailing small locomotive, light car, short train, low train speed and single-track road gradually gave way to the powerful locomotive, huge capacity car, high speed train and four-track road of this modern day.

The air brake made possible the great railway transportation systems. They in turn made possible the commerce and civilization of this modern day.

But the root and possibility of it all lay in the air brake, started in 1869, and will so continue indefinitely into the future.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

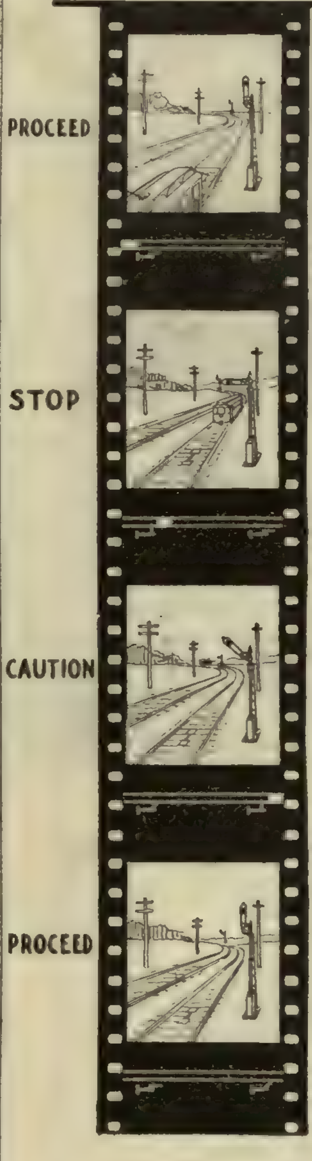
TRADE MARK

New York
San Francisco

Washington

Chicago
St. Louis

SEMAPHORE



FOR DOUBLE TRACK

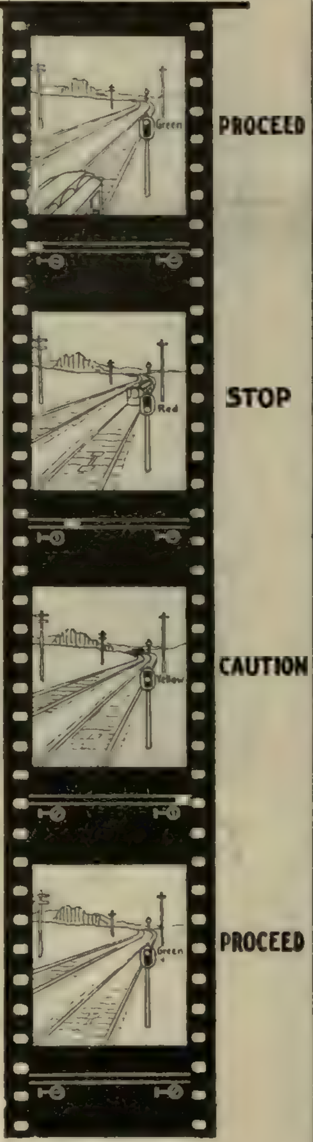
Interurban Railways

Union automatic ▪ block signals ▪

afford a simple system of indications easily understood by trainmen.

The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.

LIGHT



On the New York State Railways

On the Oakland, Antioch and Eastern

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line.*

Trade Mark

Union Switch & Signal Co.

SWISSVALE, PA.

Trade Mark

1

The Safety Car Has Become the
Standard Car Because It Put Safety First

"*. . . the modern appliances with which it is equipped make it the safest of any car operated by the Virginia Railway and Power Company in the city*" —Richmond's (Va.) Director of Public Safety

At El Paso Safeties averaged 3.03 *accidents per* 10,000 *car miles the first year compared with* 3.95 *accidents for big cars.*

During the following four months Safeties averaged only 2.95 *accidents per* 10,000 *car-miles while big car operation rose to an average of* 5.30 *accidents.* —Report of Claim Agent, El Paso Electric Railway.

Scores of regulatory bodies would not have endorsed—yea, even demanded Safety Car operation if it were not obvious to them that it deserved its name.

The first users of Safety Cars may have bought them on trust, but the railway that orders them today has for backing of its decision the actual overwhelming proof of service by thousands of cars that the Safety Car has practically abolished the step and platform accident and produced big reductions in rundowns and other accidents due to its well-nigh perfect interlocking of control braking and braking and sanding apparatus.

Every Safety Car is such because it carries the Safety Devices equipment of this company.

Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh

2

The Safety Car Has Become the Standard Car Because It Makes Competition Impossible

WHEREVER there is a trackway and any reasonably steady traffic, the electric railway continues to offer the safest, cheapest and most convenient form of transportation. This has been made possible largely by the invention of the Safety Car which can be operated on such short headways that no jitney competition can long withstand it either on busy streets or country highways:

Because the difference between a short and long headway is the difference that almost instantaneously wipes out the jitneur's margin of profit.

The attractiveness of the Safety Car to the rider is due not only to its short headways but also to its high but safe rates of acceleration and braking—one result of the teamwork introduced by the Safety Devices Combination.

SAFETY CAR

Main Office—Boatmen's Bank

CHICAGO
Railway Exchange Bldg.

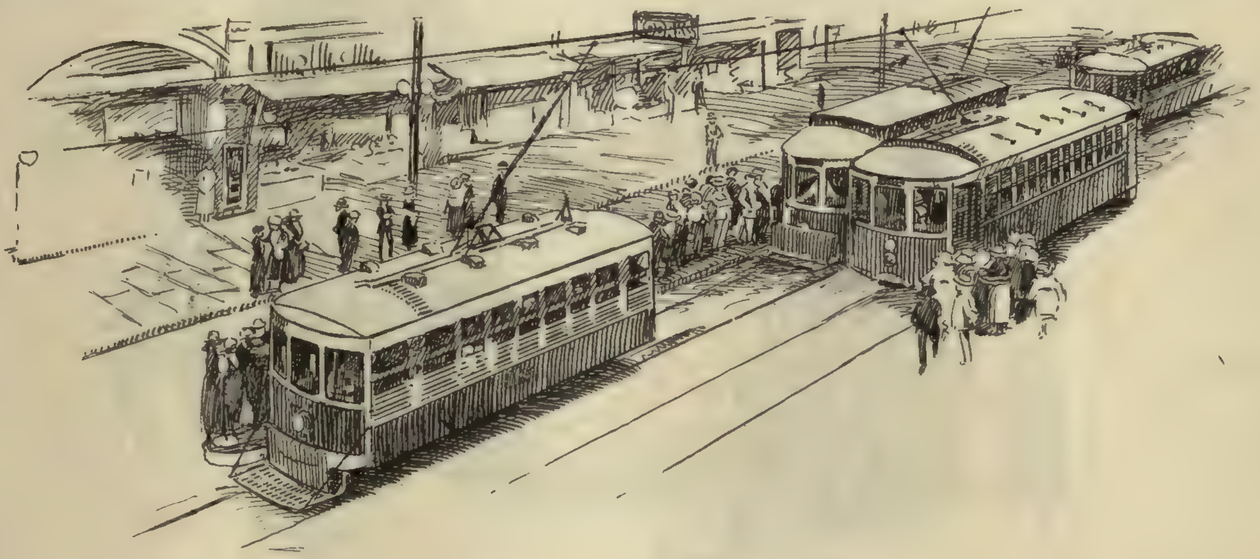
WASHINGTON, D. C.
Munsey Bldg.

San
Southern

CANADA—Canadian Westinghouse

3

The Safety Car Has Become the Standard Car Because It Makes Public Satisfaction Possible



TO continue old standards of all-day service, let alone *improve* them to meet the needs of a growing community, is clearly impossible with the big, two-man cars of the past. The safety car has made the satisfaction of the public's desire for more and better transportation possible in scores and scores of cities because it has made *anti-walking* car service practicable for more hours of the day than ever before.

If you want to get the profitable short haul rider at any hour and the profitable long haul rider of slack hours, the way is plainly marked by the experience of Terre Haute and a host of other cities, namely: use Safety Car service on a Safety Car schedule!

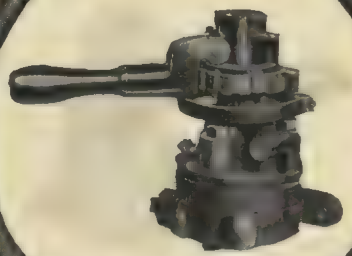
DEVICES COMPANY
Bldg., ST. LOUIS, MO.

NEW YORK
City Investment Bldg.

PITTSBURGH
Westinghouse Bldg.

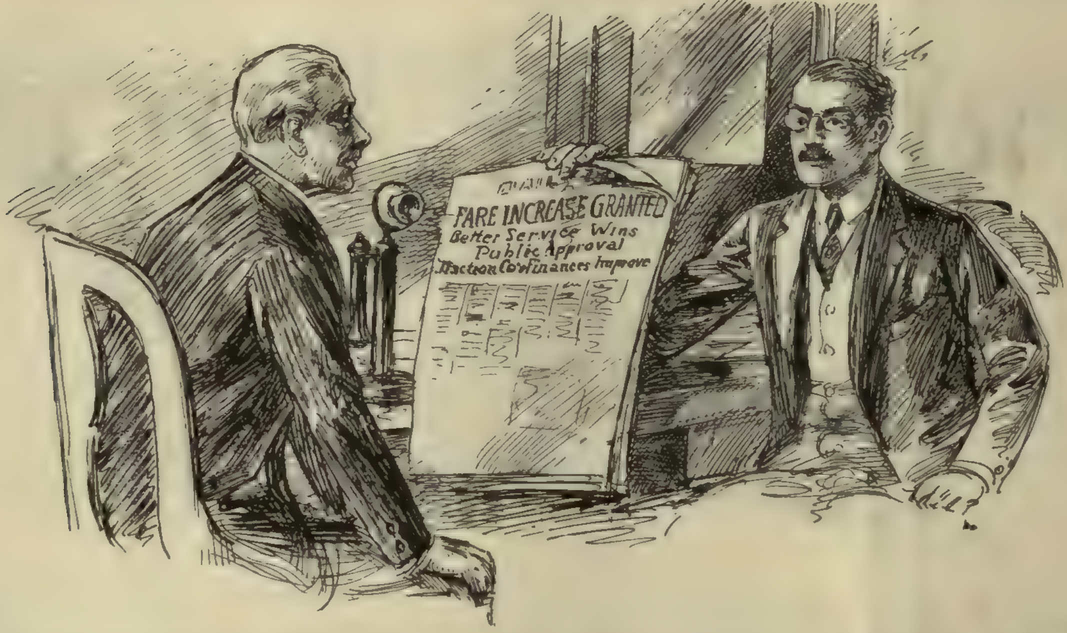
Francisco
Pacific Bldg.

Co., Ltd., Hamilton, Ont.



4

The Safety Car Has Become the Standard Car Because It Permits Reasonable Rates of Fare and Return


DAILY
FARE INCREASE GRANTED
Better Service Wins Public Approval
Traction Co's Finances Improve

No matter what latitude a railway may have in adjusting fares to meet the cost of service and a reasonable rate of return on investment, it cannot in reality charge more than the public regards as reasonable.

And "reasonable" doesn't just mean rate of fare—it also means quality of service.

Have you observed how the newer rates of fare and increased riding go together on Safety Car Systems?

And how little agitation or argument there is about allowing a fair rate of return to the railways which give such improved service?

Let us help you duplicate the success of so many others.

Safety Car Devices Company
Boatmen's Bank Bldg., St. Louis
Chicago San Francisco New York Washington Pittsburgh

"SHELBY"

Seamless Cold Drawn Steel

TROLLEY POLES

The resilient, durable poles of high efficiency

"SHELBY" SEAMLESS COLD DRAWN STEEL TROLLEY POLES are made from a selected grade of basic open hearth steel of about .17 per cent carbon, low in phosphorus and sulphur. Prior to the last cold drawing operation, the material is given a special heat treatment which leaves the grain in the finest condition. The elastic limit in the finished pole is from 60,000 to 70,000 pounds per square inch.

Recent improvements have been made in the methods of manufacture, particularly in the method of inserting the reinforcement. As now made, the reinforcement is integral with the body of the pole, which adds materially to its efficiency.

Details regarding structure and tests are given in a booklet entitled "The 'SHELBY' Seamless Cold Drawn Steel Trolley Pole". Ask for your copy today.

STEEL FOR SERVICE

NATIONAL TUBE COMPANY, PITTSBURGH, PA.

General Sales Offices: Frick Building

DISTRICT SALES OFFICES

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PACIFIC COAST REPRESENTATIVES: U. S. Steel Products Company San Francisco Los Angeles Portland Seattle
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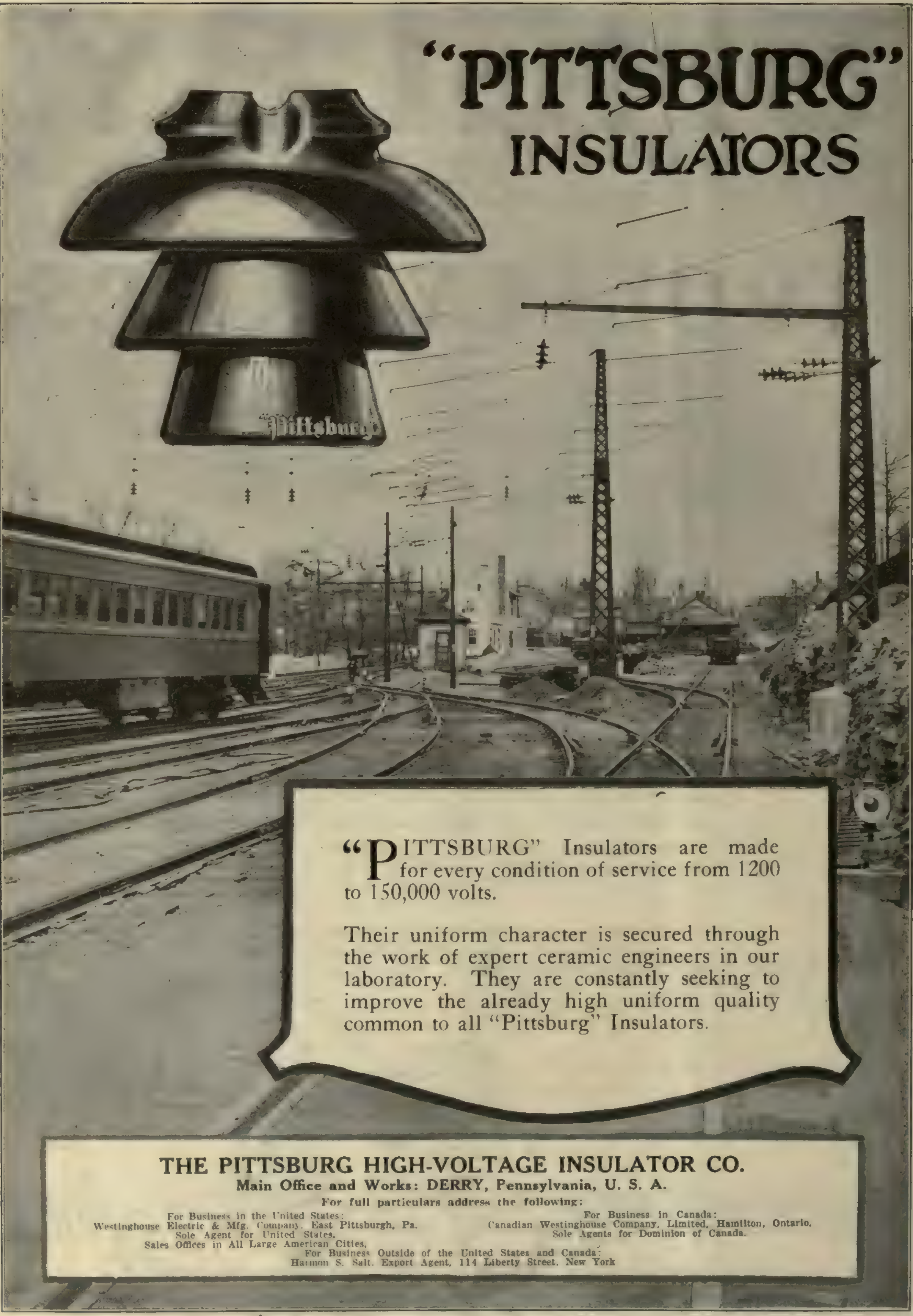


"PITTSBURG" INSULATORS

"PITTSBURG" Insulators are made for every condition of service from 1200 to 150,000 volts.

Their uniform character is secured through the work of expert ceramic engineers in our laboratory. They are constantly seeking to improve the already high uniform quality common to all "Pittsburg" Insulators.

THE PITTSBURG HIGH-VOLTAGE INSULATOR CO.
Main Office and Works: DERRY, Pennsylvania, U. S. A.

For full particulars address the following:

For Business in the United States:
Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.
Sole Agent for United States.
Sales Offices in All Large American Cities.

For Business in Canada:
Canadian Westinghouse Company, Limited, Hamilton, Ontario.
Sole Agents for Dominion of Canada.

For Business Outside of the United States and Canada:
Harmon S. Salt, Export Agent, 114 Liberty Street, New York

Phono-Electric

For Every Contact Wire Condition

Metropolitan

Brooklyn, Philadelphia, New Orleans, Youngstown, San Francisco—in almost every city the country 'round, Phono-Electric has achieved the distinction of being the *standard* trolley wire.

Years of experience has proved that Phono-Electric is the wire for city service because its strength and long-wearing qualities do so much to insure unbroken operation on the converging car-saturated downtown tracks. Its ability to withstand the wear from tilted trolley wheels makes it the only trolley wire worth considering for the sharp curves of city systems.

And so far as straight runs of tangents are concerned, Phono-Electric is well worth installing because it assures two to three times the life of ordinary wire, but not at two or three times the cost of ordinary wire.

Bridgeport Brass Company
Bridgeport Connecticut

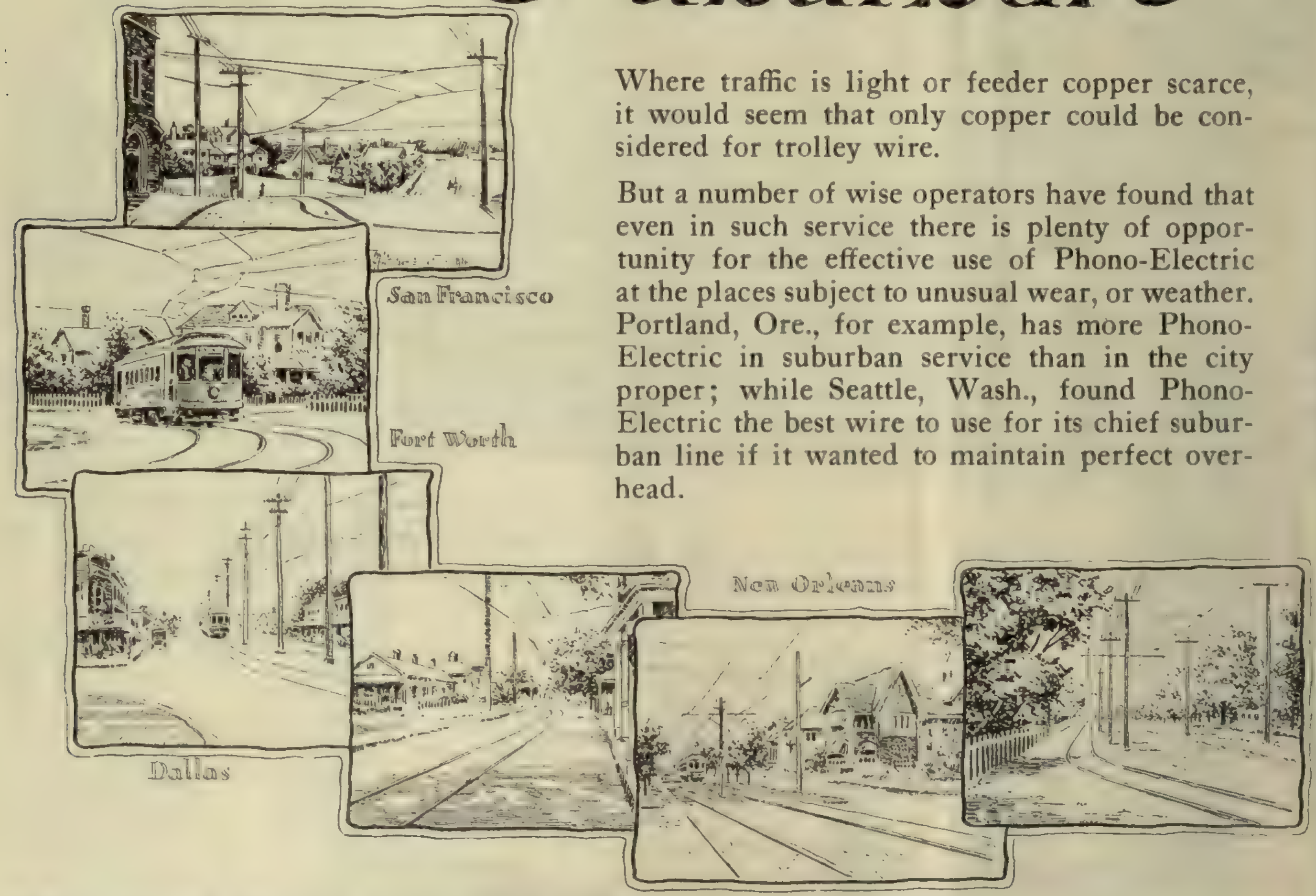
Phono

For Every Contact

Suburban

Where traffic is light or feeder copper scarce, it would seem that only copper could be considered for trolley wire.

But a number of wise operators have found that even in such service there is plenty of opportunity for the effective use of Phono-Electric at the places subject to unusual wear, or weather. Portland, Ore., for example, has more Phono-Electric in suburban service than in the city proper; while Seattle, Wash., found Phono-Electric the best wire to use for its chief suburban line if it wanted to maintain perfect overhead.



Bridgeport Brass Company

Bridgeport Connecticut

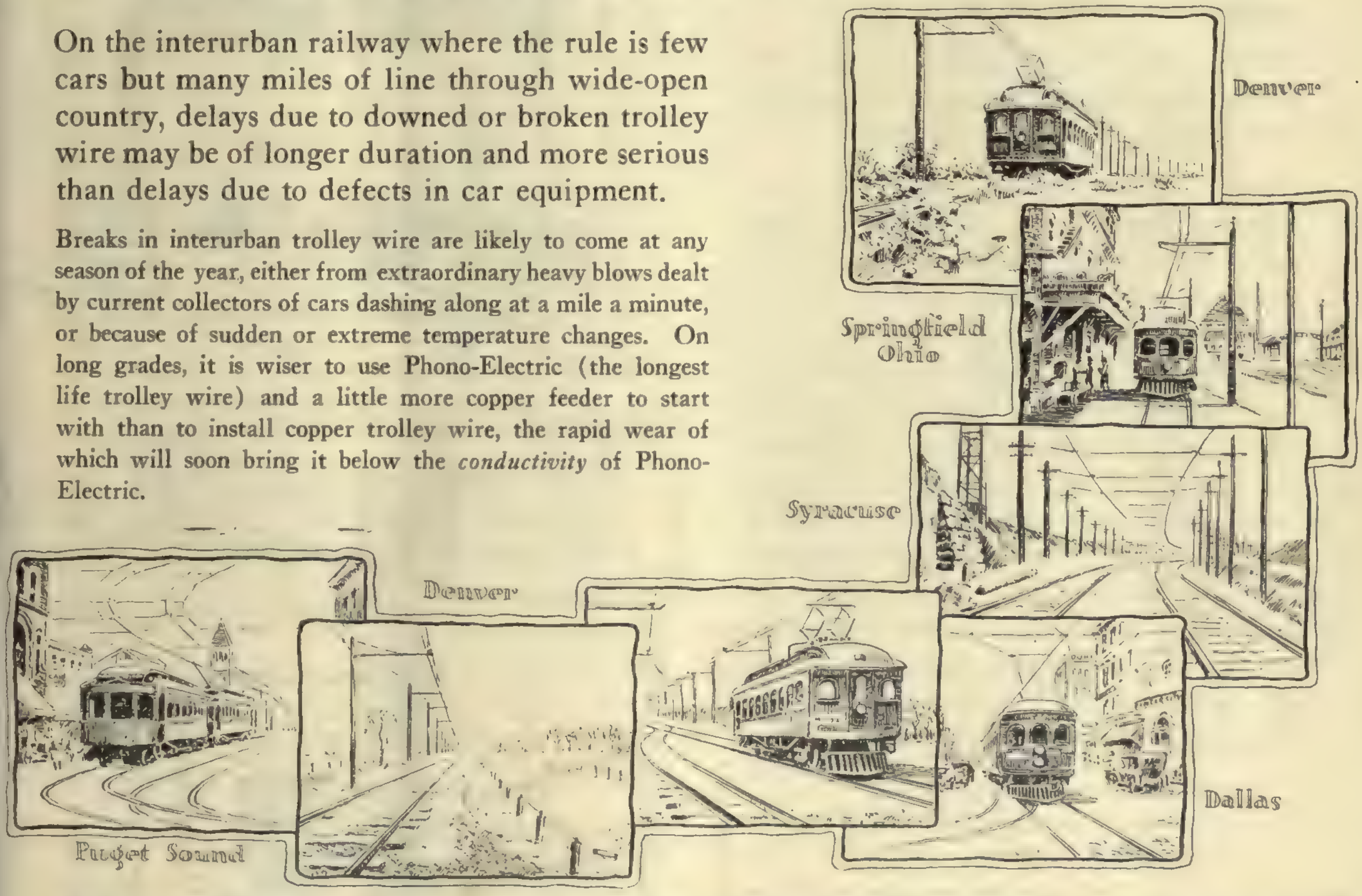
Electric

Wire Condition

Interurban

On the interurban railway where the rule is few cars but many miles of line through wide-open country, delays due to downed or broken trolley wire may be of longer duration and more serious than delays due to defects in car equipment.

Breaks in interurban trolley wire are likely to come at any season of the year, either from extraordinary heavy blows dealt by current collectors of cars dashing along at a mile a minute, or because of sudden or extreme temperature changes. On long grades, it is wiser to use Phono-Electric (the longest life trolley wire) and a little more copper feeder to start with than to install copper trolley wire, the rapid wear of which will soon bring it below the *conductivity* of Phono-Electric.



Bridgeport Brass Company

Bridgeport Connecticut

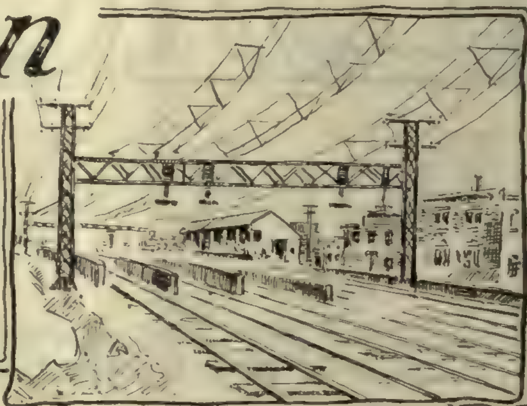
Phono-Electric
For Every Contact Wire Condition
Electrification

The first steam routes to be electrified, necessarily, are those where traffic is congested or where traffic has to be handled under unusually severe atmospheric or topographical conditions.

Hence, once electrified, it is highly desirable that everything used to maintain service on such routes *stay* put!

Phono-Electric on great electrifications like the New Haven, the Paoli (Pennsylvania) and the Norfolk & Western has staid put. It is serving equally well on all of these 11,000-volt installations; having proved on the New Haven that it is far longer-lived and less pitting than steel; on the Paoli that it can withstand the pounding of high-speed suburban trains with ease; and on the Norfolk & Western that neither locomotive gases nor the energy "drafts" required by longest trains that the electric giants can pull up long mountain grades can impair its ability to give those trains all the power they want and when they want it.

N.Y., N.H. & H. R.R.



Pennsylvania Paoli

Norfolk & Western

Bridgeport Brass Company
Bridgeport - Connecticut

Eliminate Waste—Save Power

The Rico Type "K" COASTING RECORDER

Indicates and measures the motorman's performance for each trip or series of trips as may be desired.

COASTING TIME

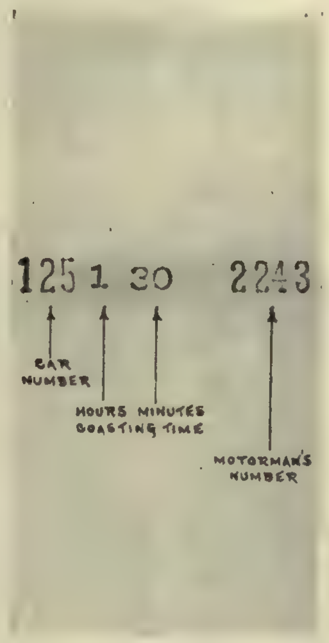
represents the recovery of energy previously expended and is the correct unit of comparative efficiency.

THE

To Successful Results

The Printed Voucher

Insures Accuracy
Eliminates Checking
Simplifies Clerical Work



Rico Anti-Climbers

Prevent Telescoping
Protect the Equipment
Reduce Accident Expense

Rico Sanitary Straps

Cost Less in the Long Run
Are Pleasing to Passengers
Improve the Appearance of Cars

Details and prices on application

RAILWAY IMPROVEMENT CO.

61 Broadway RICO New York

1888

A Bit of History with a

When horse cars were common and "horseless marvels" rare, this company began furnishing O-B Materials to electric railways.

Through the era of rapid progress and developments O-B Devices have usually set the pace in their respective fields.

In the recent times of stress O-B Products sturdily served on overburdened properties. Now with brighter days in sight O-B will still be in the front rank.

Aside from the prestige of a splendid record there is marked

The Ohio Brass Company, Mansfield, Ohio

Promise for the Future

preference for O-B Materials based upon ingenious, foresighted, sure-footed progress—upon unusual designs inspired by an intimate association with electric railway problems.

Instead of pointing to our thirty years of success, we point to comparatively recent O-B achievements like the cam tip on line material; the automatic car, air and electric coupler; the pioneer gas weld bond and its direct descendent the arc weld bond; the high efficiency type of porcelain insulators, And we promise further worth-while developments in the promising years ahead.

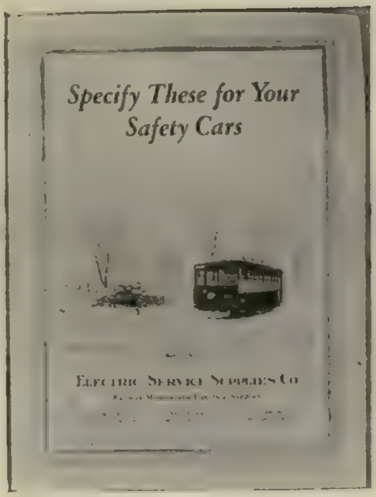
The Ohio Brass Company, Mansfield, Ohio

"Golden Glow" Headlights

Keystone Trolley Catchers

Safety Car Lighting Fixtures

KEYSTONE CAR



Specify These for Your Safety Cars

Electric Service Supplies Co

Write for your copy of this Bulletin

You will have an opportunity to examine these Keystone Car Specialties at the Atlantic City Convention. Many of them are standard equipment on the Birney Safety Car and all of them are extensively used on cars the country over. Please feel free to visit our exhibit (space No. 414)— ask for a copy of our bulletin "Specify These for Your Safety Cars."

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA	NEW YORK	CHICAGO
17th and Cambria Streets	50 Church St.	Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

Keystone Hunter Destination Signs

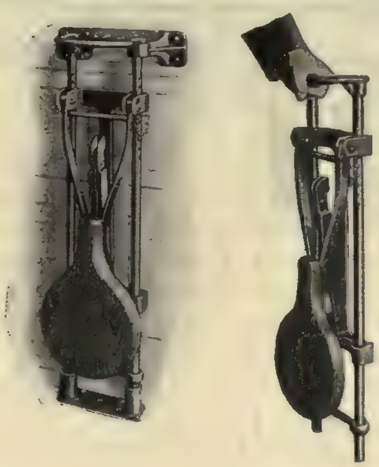
Keystone Air Sanders

Shelby Seamless Trolley Poles

SPECIALTIES

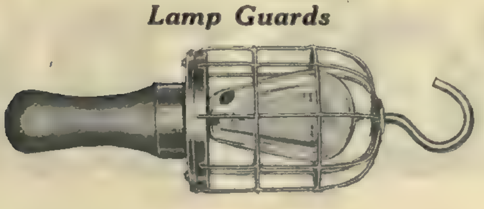
Keystone Steel Gear Cases

Keystone Motormen's Seats



Faraday High Voltage Signal System

Keystone Portable Lamp Guards



THE exceptionally high quality of Anaconda Trolley Wire is due, in part, to the material from which it is made. All Anaconda Copper Wire is drawn from the famous B & M Brand Electrolytic Copper Bars. These bars possess high electrical conductivity and physical soundness. They contain less than 1/100 of 1% metallic impurities.

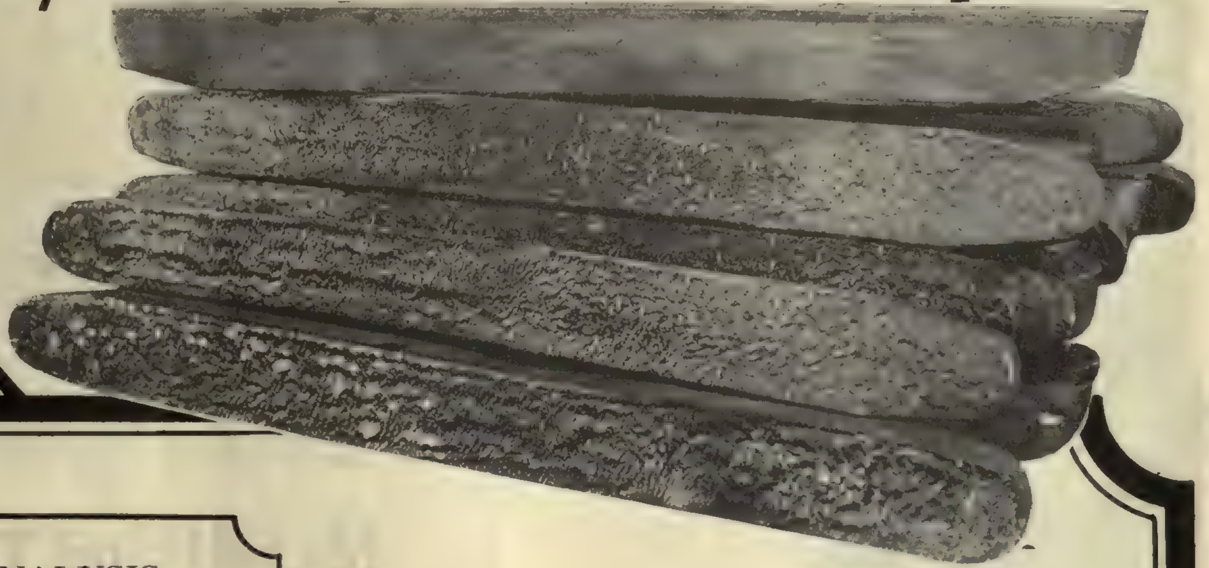
Another reason for Anaconda quality is traceable to manufacturing methods, supervision of which starts at the very source of the raw material supply.

Each step, from the time the ore is taken from the mine until the finished product is loaded for shipment, is carried out under exacting Anaconda supervision.

Electric Railways everywhere have learned to rely upon the name "Anaconda" as a mark of superiority, and to specify Anaconda Trolley Wire wherever maximum service is required.

ANACONDA

For—made for Electric Railways from the famous B. & M. Brand Copper containing less than 1/100 of 1% metallic impurities



ANALYSIS

The following is an analysis of B & M Brand Electrolytic Copper:

Copper	99.96
Oxygen	.03
Silver	.0022
Bismuth	.0004
Sulphur	.002
Iron	.0006
Nickel and Cobalt	.0006
Arsenic	.0017
Antimony	.0016
Silenium	.0009
	100 0000

ANACONDA COPPER MINING CO.

Rolling Mills Department
Mills—Great Falls, Mont.

GENERAL OFFICES
111 W. Washington St., Chicago, Ill.

Copper Wire

Imperial Tie

Not ONE Tool—

The Imperial Tie Tamper was brought out in 1915 as a *tamper,* but it did not take the bright way engineers on electric railways long to discover that it could be adapted to all sorts of jobs which, of course, means that hardly any electric railway is too small to get its investment back in short order.

Let these examples of Imperial Tie Tamper adaptability, taken from practice, prove that this tool is truly **protean** in variety of usefulness!

Concrete excavators, concrete breakers, grinders and drills are some of the adaptations made by the Los Angeles Railway, whose Chief Engineer, Mr. T. W. Bulpin, wrote in the Electric Railway Journal for Feb. 21, 1920, that this equipment had made it "possible to meet any ordinary requirements connected with track work; and as we have another of these machines on the way, it is needless to say, we believe in them, and are more than satisfied with the results we get from them." Let us add that Mr. Bulpin conceived the happy idea of mounting the equipment on an auto-trailer to secure the desired flexibility of a trackless vehicle.

Pneumatic riveting of rail joints is a "side line" of the Imperial developed on the Rochester Lines of the New York State Railways.

Stripping asphalt and cutting concrete under asphalt was one stunt of the Elmira (N. Y.) Water, Light & Railroad Company which reported also that

Make Hand Tamping
As Obsolete As the

Ingersoll-Rand

11 Broadway
NEW YORK

Offices the

Tamper

but a DOZEN!

the Imperial made it possible to do with five men as much and better work than with twenty-four men using hand picks.

Clearing up dirt and debris where new and old concrete join or in concrete pours against metal, *cleaning rust off of bridges* and *supplying air for ground-thawing torches* were contributions to the experience fund made by the Rhode Island Company.

Saving the cost of Thermit preheater blowers produced a substantial reduction for the Pittsburgh Railways in the installation of Thermit Rail Welds because the company could get the compressed air needed from the pneumatic tamper equipment.

Winter drilling of bolt and tie-rod holes in short pieces of rail helped to keep the Imperial busy in the off-season and saved the United Traction Company of Albany, N. Y., a lot of time in replacing broken rails. *Cleaning old brick* at the storage yard at twelve times the speed of manual labor was another off-peak job for the Imperial.

And as a Tamper all users are agreed that it is superior to hand labor in any kind of ballast from sand to rock. Its ability to tamp the narrow spaces in special work far better than the most conscientious operator has been noted by many electric railway engineers who know that the special work for busy city intersections must have the very best attention in building up its foundation.

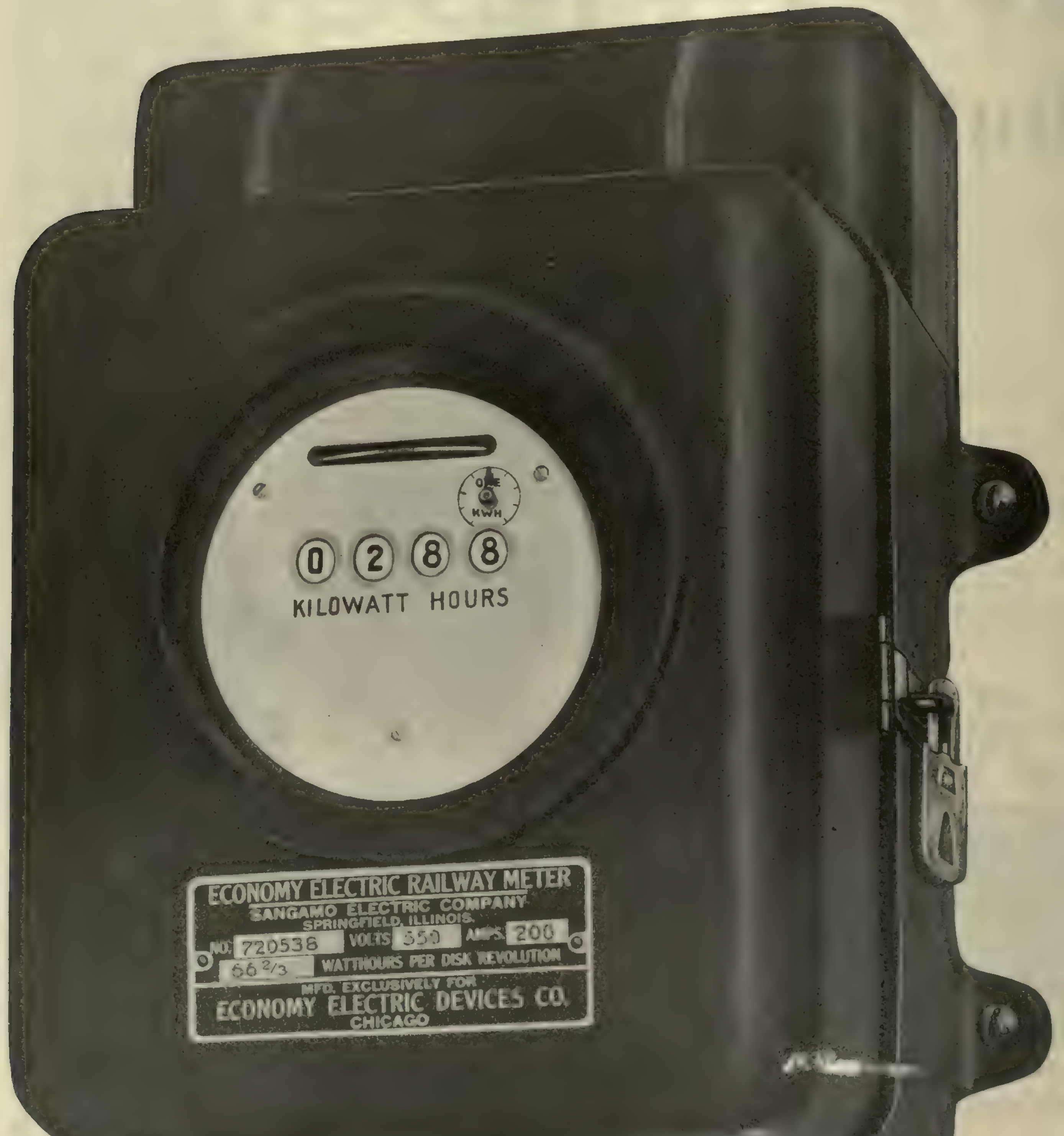
on Your System
Horse Car!

Company

165 Q. Victoria St.
LONDON

World Over

Measure the Unit to


ONE KWH
0288
KILOWATT HOURS
ECONOMY ELECTRIC RAILWAY METER
SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS.
NO. 720538 VOLTS 550 AMPS. 200
66 2/3 WATTHOURS PER DISK REVOLUTION
MFD. EXCLUSIVELY FOR
ECONOMY ELECTRIC DEVICES CO.
CHICAGO

be Saved—POWER

If you are trying to save power—measure the unit you are trying to save—not an indirect unit.

The ECONOMY Meter measures in "power units," not in indirect units as do other devices.

The ECONOMY Meter stimulates correct feeding and braking. Other devices put a high premium on excessively fast feeding, which does not correspondingly reduce energy consumption.

Every operating official, every motorman, every mechanic, knows what a watthour meter is and what it measures. The ECONOMY Meter measures the power consumed by the car.

When using ECONOMY Meters motormen appreciate and know absolutely, trip by trip, whether or not their efforts result in actual reductions of power. With other power saving devices motormen do not directly know whether they have actually saved power.

There is no mystery about power saving with ECONOMY Meters

The ECONOMY Meter requires *minimum* attention in its upkeep and maintenance. It does not need attention at frequent intervals to insure its continuous accurate operation.

The ECONOMY Meter is a rugged time- and service-tried device. Over 500,000 Sangamo meters with the same type elements are in daily use for all manner of purposes where meters are needed that will withstand rough usage.

ECONOMY Meters installed on your cars will induce savings of from 10 to 20% of your total traction power. More than 50 complete installations and numerous tests have demonstrated this.

ECONOMY Meters afford a correct and dependable basis on which car equipment can be inspected and maintained.

More than 50 roads completely equipped.

Ask for Deferred Payment Plan and estimate of operating costs

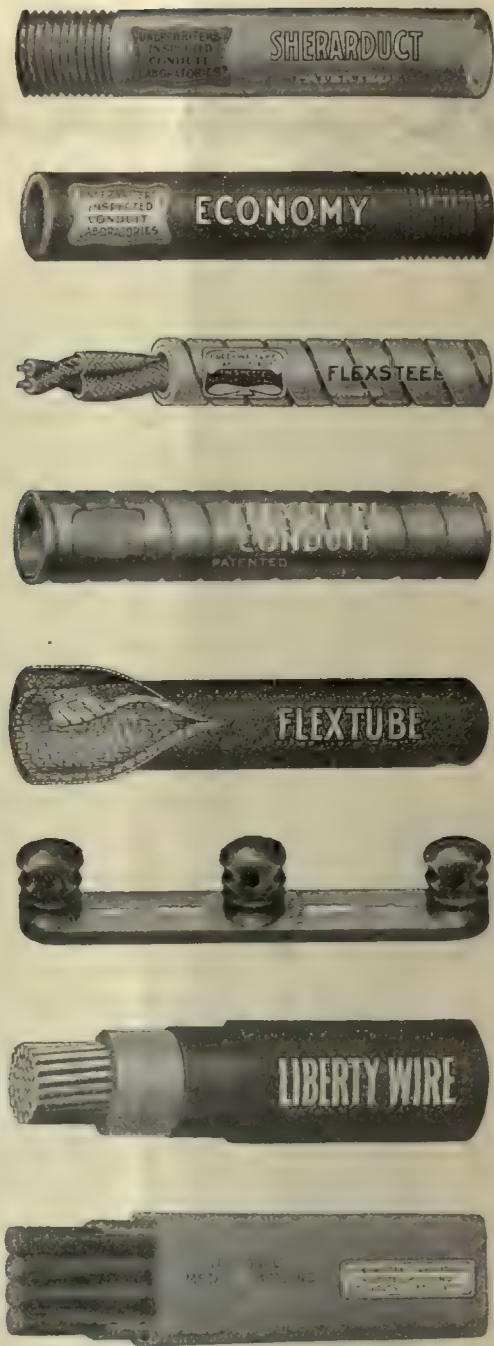
See
Pages
180-181

ECONOMY ELECTRIC DEVICES COMPANY

L. E. GOULD, Pres.

Old Colony Bldg., Chicago

National Railway Appliance Co., New York
L. A. Nott, San Francisco
Burton R. Stare Co., Seattle
J. G. Monahan, Los Angeles
Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis



"All You Require When You Wire"

The wiring of any type of Electric Railway Car or Power House can be properly handled with National Products. Every inch of National Conduit and every National Fitting, etc., surpasses specifications for durability, cleanliness and ease of "fishing"; and they possess specific advantages for the particular work for which intended.

A complete set of our convenient and helpful Correspondence Folder Catalogs will be sent upon request.

National Metal Molding Co.

General Offices: Pittsburgh, Pa.

Atlanta
Boston
Chicago
Denver
Detroit
Los Angeles
New York
Philadelphia
Portland
Salt Lake City
San Francisco
Seattle
Buenos Aires
Rio de Janeiro
Sao Paulo, Brazil
Lima, Peru
Santiago, Chile
Medellin, Colombia
Havana
Manila
Mexico City
Shanghai, China

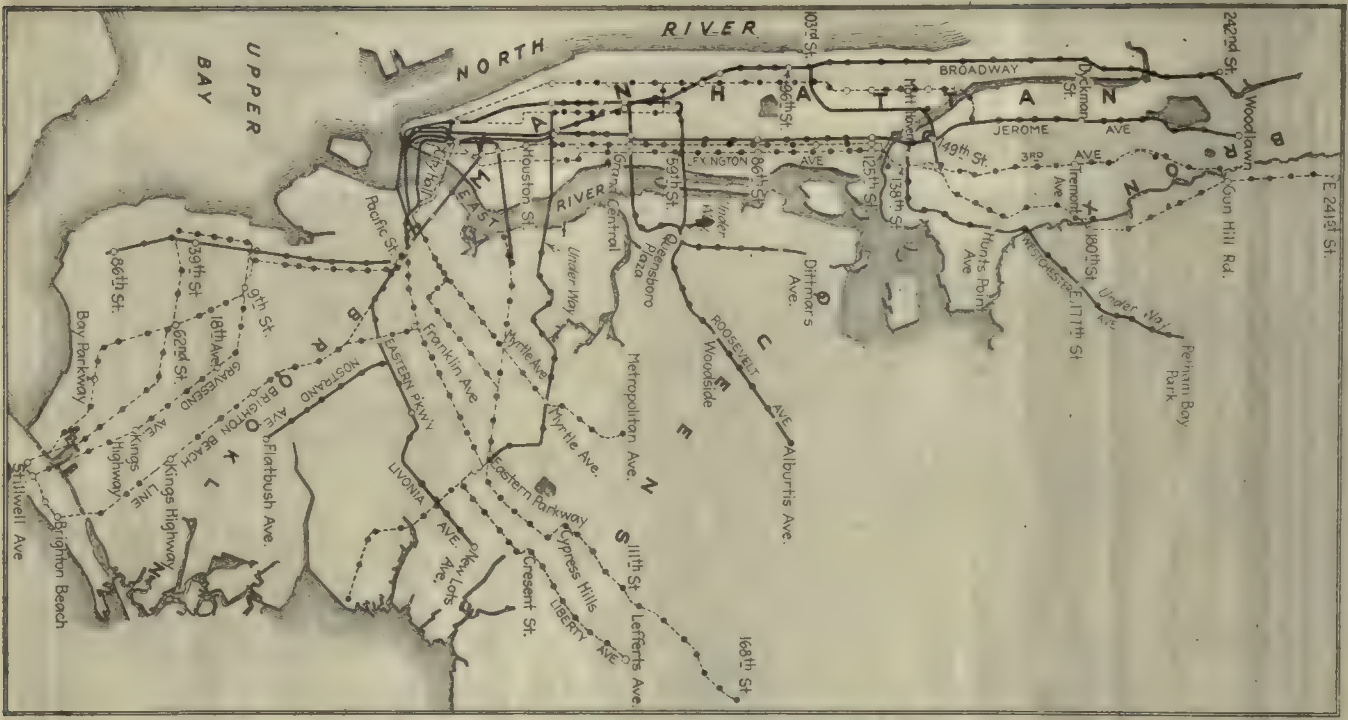
Canadian Distributors: Canadian General Electric Co., Limited.

National Products are sold by Electrical Jobbers in every section of the country.

A Pneumatized car
is a better car
in any kind of
electric railway operation

National Pneumatic Company, Inc.
50 Church St., New York **Edison Bldg., Chicago**
Works: Rahway, N. J.

NPC



The lines that carry over a billion passengers a year

First Used in *Hardest* Service

Standardize *Pneumatize*

Nowhere else in the world is there such intensive *long*-train, *short*-headway traffic as in the subways of the Interborough Rapid Transit and Brooklyn Rapid Transit (New York Municipal) Companies.

There, if anywhere, time and safety are all-in-all.

Which accounts for the fact that since the first days of door engine application, the great majority of the cars have been equipped with National Pneumatic Door Engines—manually controlled on the Interborough center-door cars and push-button controlled on the multi-side-door Brooklyn cars.

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

Rear-entrance motor and front-entrance trailers prove quick loaders

Montreal Pioneer in Two Big Advances

Standardize *Pneumatize*

Every electric railway operator knows that the beginning of the modern electric railway car had its roots in Montreal's invention and application of the pay-as-you-enter car in 1905.

And this time Montreal leads the industry as the first surface railway to decide (in 1918) upon the pneumatization of practically all its cars, single or in trains, with National Pneumatic equipment.

Aside from the usual advantages of this labor and time-cutting equipment, Montreal finds the pneumatized car with its speedy door closing a big step forward in more effective and less expensive car heating when the Canadian winters are at their worst.

National Pneumatic Company, Inc.
50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

Philadelphia's pneumatized cars surely please the shopper

On Philadelphia's "Public Service" Cars

Standardize *Pneumatize*

In 1911, when the Philadelphia Rapid Transit Company began its far-reaching program of car replacement, the development of National Pneumatic car speed-up devices was in its early stages.

In 1919, the management decided that "the perfection of automatic door-control devices, however, by means of which premature starting is prevented until all doors are safely closed" made it practicable to change to post-payment, center-exit operation.

Philadelphia's decision crystallized in an order for the pneumatizing of 1500 cars with National Pneumatic Door Engines, Signal Lights and Safety Interlocking Door Control—the biggest of its kind ever placed.

National Pneumatic Company, Inc.
50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

A first class load on a first class train

Giving Rapid Transit to America's Greatest Shipyard

Standardize *Pneumatize*

The wide range of National Pneumatic speed-up devices is exemplified by the Philadelphia Rapid Transit Company's three-car all-motor train service to the Hog Island Ship Yard.

These cars have 2⅝ x 4½ National Pneumatic Door Engines for electro-pneumatic operation, Signal Lights and Interlocking Safety Door Control Complete. The cars are operated pay-within at the rear, the front exit door of each follower car being operated by the conductor of the car ahead.

Speed is the essence of these trains, from the automatic functioning of the control, when the train line cock is thrown in on coupling, to the automatic starting of the three cars as *one* when the last door closes.

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

One way out, the other way in, plus pneumatic control and boarding platforms make passenger interchange perfect

At Work for Uncle Sam

Standardize *Pneumatize*

Washington is not thought of commonly as a busy city, but, if there are few factories, there are many heavily-staffed departments of the National Government whose poor spread of working hours leads to still steeper peaks than many an industrial city.

Substantial relief in speeding up passenger transport is being obtained by pneumatizing the various kinds of cars. The Capital Traction Company, for example, has purchased National Pneumatic GM 2⅝ x 4½ Door Engines for 70 new and 52 present cars.

The boarding platforms save the steps; the National Pneumatic equipment save the seconds!

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

Capital Service to the Capitol is given
with trains that are Pneumatized

In the Shadow of the Capitol

Standardize *Pneumatize*

This two-car motor and trailer outfit of the Washington Railway & Electric Company is one of a number which that company has put on to give the very best in railway service. There will be 62 new motor cars alone equipped with National Pneumatic devices, aside from some trailers.

The trailer is a double-end car remodeled from an open bencher. Like the motor car, each corner is equipped with a National Pneumatic manually-controlled engine from a stand in the center of the bulkhead opening. Double four-leaf doors provide two passages for exit and entrance, but with the going of the last exit passenger, both aisles are available for boarding so that the conductor can clean up a load on the platform while the car is making *money miles.* National Pneumatic Motorman's Signal Lights? Of course!

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

From single small ones to triple big ones
is Boston's car story

Three-Car Trains Make Good on Boston's Highways

Standardize *Pneumatize*

A few years ago the prevailing car of Boston was a small single-trucker. But Boston has grown so rapidly that first two-unit and now three-unit combinations of *large* cars operated on 4 minute headways are taken as a matter of course.

By this arrangement, as on the Coolidge Corner line, the theoretical schedule speed was reduced from 10.05 mph. to 9.92 mph., but actually the speed is as good as it was with fewer individual cars and more men while track capacity has been increased and congestion consequently decreased.

Following the satisfactory operation of the first National Pneumatic equipments, the company has recently ordered, in addition, National Pneumatic manual-pneumatic type door engines for 75 center-entrance trailers and National Pneumatic Door Engines for 65 elevated cars.

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago

Works: Rahway, N. J.

Prepayment areas and pneumatized cars meet the rush
at Sparrow's Point well

Baltimore Joins the Three-Car Train Class

Standardize *Pneumatize*

The United Railways & Electric Company of Baltimore has something right up to the minute to offer the patrons of its three-car multiple-unit trains to the shipyards at Sparrow Point.

The units of each train are of the standard Baltimore body type with rear entrance and front exit doorway, each wide enough for two streams of passengers. Like the Hog Island Navy Yard three-car trains of the Philadelphia Rapid Transit Company, each conductor controls the front exit of the car behind through the use of National Pneumatic Door Engines, Signal Lights and Interlocking Safety Door Control.

And, of course, the same line of equipment is going on the new two car trains made up of a standard Baltimore pay-within car and side-door trailers, except that manual operation remains on the motor cars.

National Pneumatic Company, Inc.
50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

Study this picture—it shows why the Petewit is popular at Buffalo

Adding Capacity to a Four-Track Street!

Standardize *Pneumatize*

When even a four-track main street is taxed, as in Buffalo, there's no doubt that the time has arrived for cars that can be loaded almost instantaneously in the congested area and discharged with least friction in the residential sections.

That helps to account for the use of Peter Witt pay-leave cars in Buffalo. And, of course, they would be only part efficient if they were not, to the number of 130, equipped with National Pneumatic Door Engines with manual pneumatic control for both the folding doors at the front and the sliding doors at the center.

National Pneumatic Motorman's Signal Lights and Interlocking Safety Door Control are also a feature of these cars which are equipped for train operation, too.

National Pneumatic Company, Inc.
50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

Good suburban—interurban service made better still by pneumatizing

To George Washington's Home via National Pneumatic

Standardize *Pneumatize*

That there is a field for National Pneumatic equipment in snappy suburban and interurban service is evident from the fact that the Washington-Virginia Railway is now running to Mount Vernon two-car trains fitted with National Pneumatic Door Engines with manual-pneumatic control for folding doors and National Pneumatic Interlocking Safety Door Control in addition to Motorman's Signal Lights.

The adoption of these devices for a service patronized by so many visitors necessarily unfamiliar with the equipment is eloquent testimony to this operator's ambition to combine speed with safety.

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

Lively traffic on Washington Street and other St. Louis streets has brought the need for speed-up equipment

Interlocking Safety Door Control Crosses the Mississippi

Standardize *Pneumatize*

Like Horace Greeley's young man, National Pneumatic Interlocking Safety Door Control is moving westward, although the National Pneumatic Door Engine itself reached the Pacific Coast more than a year ago.

St. Louis is the first trans-Mississippi city which will install this equipment on a practical scale, the first order covering 100 new cars and some scores of existing cars.

By this one factor in National "Rushour" equipment, the United Railways of St. Louis will completely eliminate boarding and alighting accidents accompanied by an appreciable *increase* in schedule speed.

National Pneumatic Company, Inc.
50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

Safety car and big car,
both have National Pneumatic door engines

Kansas City Pneumatizes the Big Cars, Too

Standardize *Pneumatize*

As one example of the effective work of the Safety Car in demonstrating the merits of National Pneumatic Door Engines, there is the Kansas City Railways Company.

Pleased with the workings of its pneumatized Safety Cars, this company soon ordered 100 sets of National Pneumatic 2⅝ x 4½ engines for folding door operation on existing double-truck cars.

Thus will the company, through the quicker and *laborless* opening and closing of the doors on these *big* cars, be enabled to reduce their standing time and thereby increase the carrying capacity of congested downtown track.

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

In the town that blazed the trail of the pneumatized safety car

The Safety Car Is a Pneumatized Car

Standardize *Pneumatize*

The first practical installation of Safety Cars ever made—that at Fort Worth in November 1916—included the National Pneumatic Door engine as an integral part of the now-famous Safety Devices combination of the Safety Car Devices Company.

Every one of the thousands of Safety Cars in use today is equipped with National Pneumatic Door Engines.

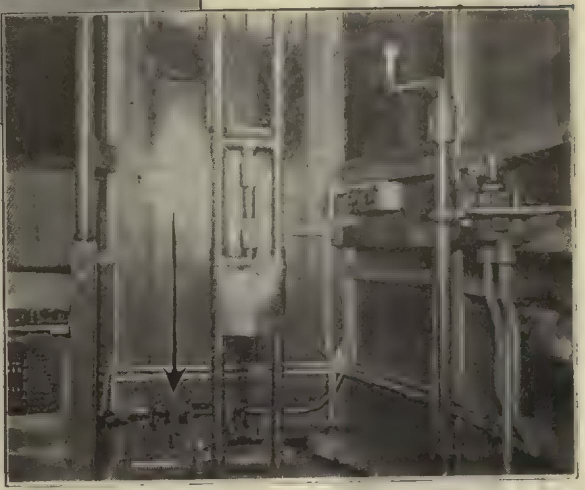
We know of no better proof that the air-operated or pneumatized car is a success than the brilliant results it has given on the many Safety Cars sent to small properties where any weakness in design, material or operation would be exaggerated by their users' lack of modern maintenance facilities and maintenance labor.

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago

Works: Rahway, N. J.

No car too big or too small for laborless pneumatic operation



The Standard Engine for the Foot-Control Car

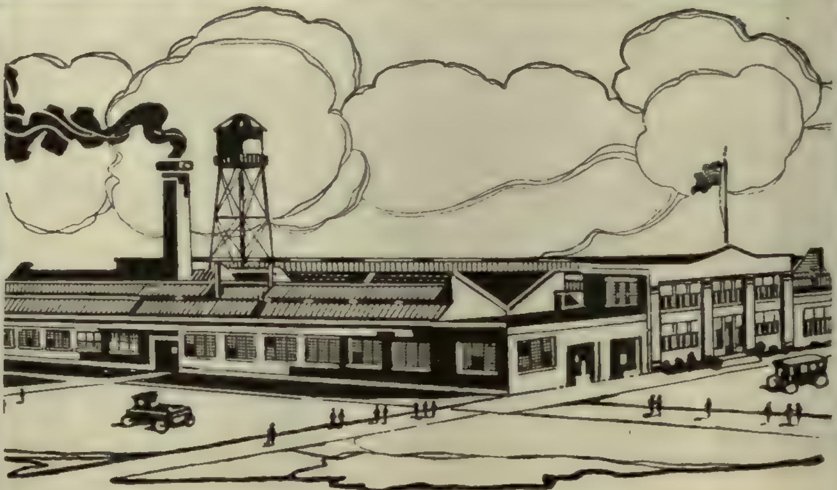
Standardize *Pneumatize*

The Third Avenue Railway System, New York, was the first to use National Pneumatic Safety Interlocking Door Control, in which the closing of the conductor's doors starts the car automatically from the first notch of the controller.

The safe, yet, immediate getaway obtained by National Pneumatic Interlocking Safety Door Control has since made it the standard on the principal city properties of the country.

And, now, in bringing out his unique foot-control car, Mr. J. S. McWhirter, Superintendent of Equipment, Third Avenue Railway System has incorporated the National Pneumatic Door Engine of electro-pneumatic type as an essential and inevitable part of any up-to-the-minute car!

National Pneumatic Company, Inc.
50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.



Indispensable "Main Line" Apparatus
Not Mere Auxiliaries
On Modern Electric Railway Cars

Standardize *Pneumatize*

The National Pneumatic "Rushour" line is a line of essentials. not accessories, in the effective operation of modern electric cars in city, suburban or rapid transit operation.

It comprises:

National Pneumatic Door and Step Control
National Pneumatic Motorman's Signal Lights
National Pneumatic Safety Interlocking Door Control
National Pneumatic Door and Step Operating Mechanisms
National Pneumatic Multiple Unit Door Control which permits one man to control every door in every car of his train simultaneously

Each and every one of these time-saving, money-bringing devices is at your service for new cars or old.

National Pneumatic Company, Inc.

50 Church St., New York **Edison Bldg., Chicago**
Works, Rahway, N. J.

The "CHEATHAM SWITCH"

1—is used by nearly every important street railway

2—is wonderfully rugged

3—is remarkably simple

4—is low in maintenance

5—is a time and labor saver

For details—write to

Cheatham Electric Switching Device Co.
4781 Louisville Ave.
Louisville, Ky.

In Yosemite National Park

YEARS ago U. S. Government Engineers specified Armco Culverts made from American Ingot Iron for the thoroughfares of some of our large national parks. The wisdom of their selection has been proved by the perfect condition of the culverts today.

The illustration shows one of these Armco culverts, installed in 1909, with nearly 11 years of service to its credit. If you, too, want culverts that will endure year after year, with no expense for repairs, then specify Armco.

There is a manufacturer in nearly every state, and in Canada, making genuine rust-resisting **ARMCO CULVERTS** and other products of American Ingot Iron such as flumes, siphons, tanks, road signs, roofing, etc. Write for full information and nearest shipping point on products in which you are interested.

ARMCO
AMERICAN INGOT IRON
RESISTS RUST

ARMCO CULVERT & FLUME MFRS. ASSN.
TRANSPORTATION BLDG. CHICAGO

Ask thousands of operating officials in over 45 countries

ACKLEY

The State of Your Equipment

has an important influence on the attitude of the public and of your employees.

But beyond all this, it is vitally necessary for most of us just now to employ all means to prolong the useful life of rolling stock and plant.

G&B PAINT RUST & ACID FUME PROOF

The Ideal Maintenance Paint

There is no material entering into power plant or railway construction or maintenance which will not have its efficiency, its life and its appearance bettered by the use of this paint.

G & B

is the ideal anti-corrosive. *It is acid fume, rust and damp proof.* It is economical in first cost, while as for life, we have records of 15 years' service.

It must be an unusual paint which prompts users to send unsolicited letters of commendation.

Drop in at Booth 13, American Electric Railway Exhibit, and read what they say. You will not be surprised then at the volume of our repeat orders.

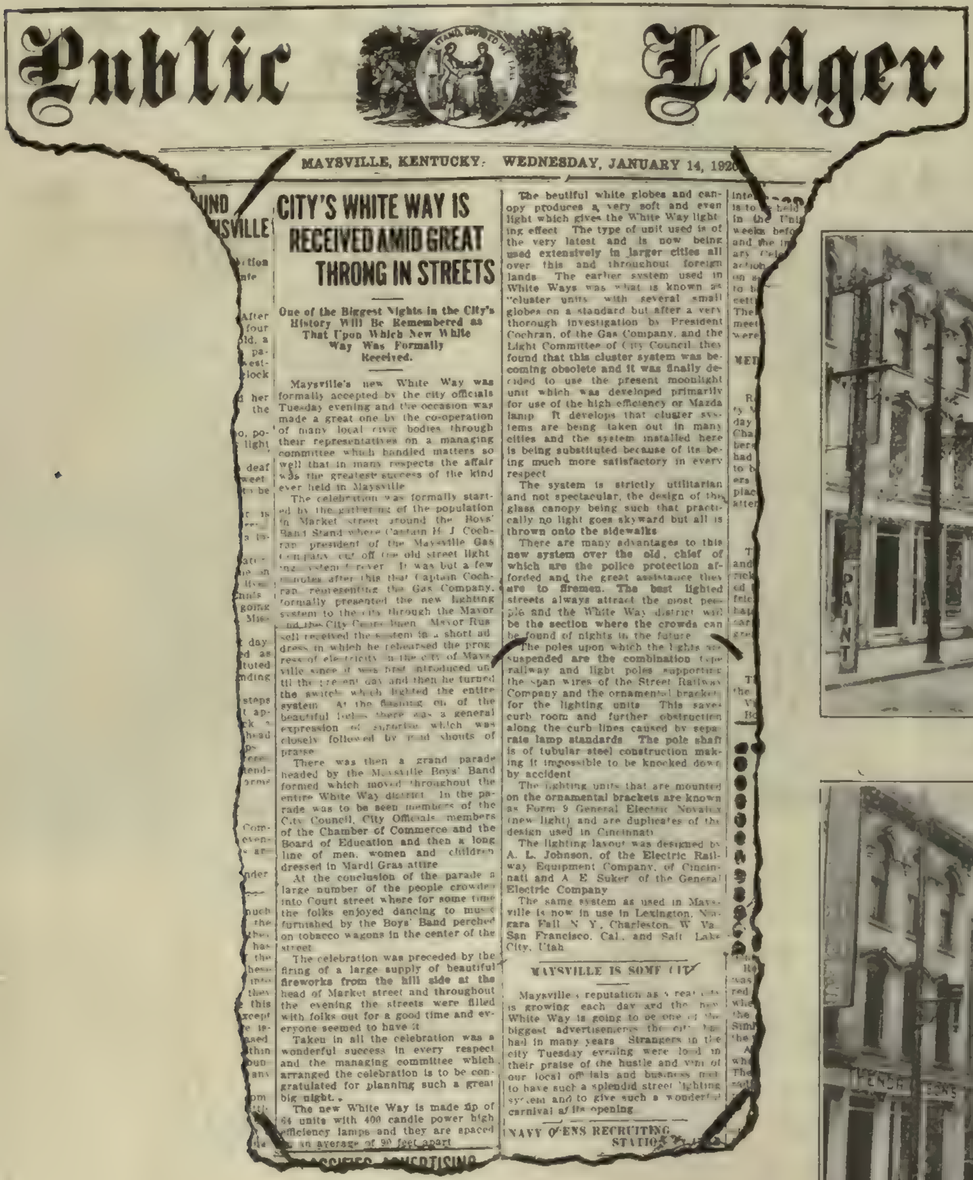
Ackley Brake & Supply Corporation

G. S. Ackley & Co., Representative

50 Church St., New York, U. S. A.

Cable Address: Acklebrake

What Maysville Did



Public Ledger

MAYSVILLE, KENTUCKY. WEDNESDAY, JANUARY 14, 1920

CITY'S WHITE WAY IS RECEIVED AMID GREAT THRONG IN STREETS

One of the Biggest Nights in the City's History Will Be Remembered as That Upon Which New White Way Was Formally Received.

Maysville's new White Way was formally accepted by the city officials Tuesday evening and the occasion was made a great one by the co-operation of many local civic bodies through their representatives on a managing committee which handled matters so well that in many respects the affair was the greatest success of the kind ever held in Maysville.

The celebration was formally started by the gathering of the population in Market street around the Boys' Band Stand where Captain H. J. Cochran, president of the Maysville Gas Company, cut off the old street lighting system forever. It was but a few minutes after this that Captain Cochran, representing the Gas Company, formally presented the new lighting system to the city through the Mayor and the City Councilmen. Mayor Russell received the system in a short address in which he rehearsed the progress of electricity in the city of Maysville since it was first introduced until the present day and then he turned the switch which lighted the entire system. At the flashing on of the beautiful lights there was a general expression of surprise which was closely followed by loud shouts of praise.

There was then a grand parade headed by the Maysville Boys' Band formed which moved throughout the entire White Way district. In the parade was to be seen members of the City Council, City Officials, members of the Chamber of Commerce and the Board of Education and then a long line of men, women and children dressed in Mardi Gras attire.

At the conclusion of the parade a large number of the people crowded into Court street where for some time the folks enjoyed dancing to music furnished by the Boys' Band perched on tobacco wagons in the center of the street.

The celebration was preceded by the firing of a large supply of beautiful fireworks from the hill side at the head of Market street and throughout the evening the streets were filled with folks out for a good time and everyone seemed to have it.

Taken in all the celebration was a wonderful success in every respect and the managing committee which arranged the celebration is to be congratulated for planning such a great big night.

The new White Way is made up of 64 units with 400 candle power high efficiency lamps and they are spaced an average of 90 feet apart.

The beutiful white globes and canopy produces a very soft and even light which gives the White Way lighting effect. The type of unit used is of the very latest and is now being used extensively in larger cities all over this and throughout foreign lands. The earlier system used in White Ways was what is known as "cluster units" with several small globes on a standard but after a very thorough investigation by President Cochran, of the Gas Company, and the Light Committee of City Council they found that this cluster system was becoming obsolete and it was finally decided to use the present moonlight unit which was developed primarily for use of the high efficiency or Mazda lamp. It develops that cluster systems are being taken out in many cities and the system installed here is being substituted because of its being much more satisfactory in every respect.

The system is strictly utilitarian and not spectacular, the design of the glass canopy being such that practically no light goes skyward but all is thrown onto the sidewalks.

There are many advantages to this new system over the old, chief of which are the police protection afforded and the great assistance they are to firemen. The best lighted streets always attract the most people and the White Way district will be the section where the crowds can be found of nights in the future.

The poles upon which the lights are suspended are the combination type railway and light poles supporting the span wires of the Street Railway Company and the ornamental brackets for the lighting units. This saves curb room and further obstruction along the curb lines caused by separate lamp standards. The pole shaft is of tubular steel construction making it impossible to be knocked down by accident.

The lighting units that are mounted on the ornamental brackets are known as Form 9 General Electric Novalux (new light) and are duplicates of the design used in Cincinnati.

The lighting layout was designed by A. L. Johnson, of the Electric Railway Equipment Company, of Cincinnati and A. E. Suker of the General Electric Company.

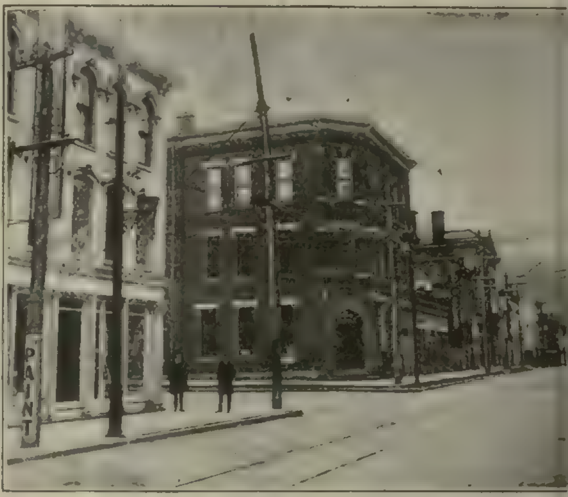
The same system as used in Maysville is now in use in Lexington, Niagara Fall, N. Y., Charleston, W. Va., San Francisco, Cal., and Salt Lake City, Utah.

MAYSVILLE IS SOME CITY

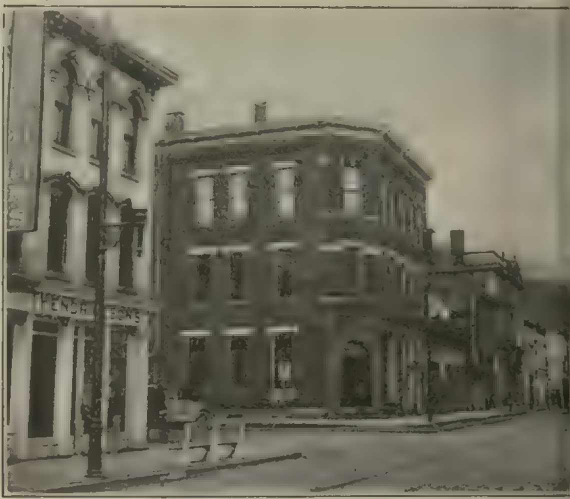
Maysville's reputation as a real city is growing each day and the new White Way is going to be one of the biggest advertisements the city has had in many years. Strangers in the city Tuesday evening were loud in their praise of the hustle and vim of our local officials and business men to have such a splendid street lighting system and to give such a wonderful carnival at its opening.

NAVY OPENS RECRUITING STATION

Note this Clippin
and the Photos



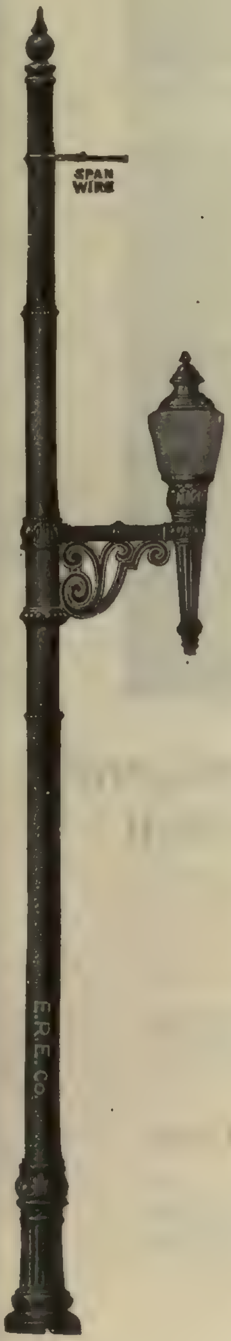
No. 1—Before the Improvement



No. 2—After the Improvement

ELRECO

YOUR CITY Can Do!



—and your railway will *profit*

Is your city as progressive as Maysville, Kentucky? This wideawake spot on the map, with its Chamber of Commerce and wideawake STREET RAILWAY OFFICIALS decided that *one pole* would be enough to support the railway span wires, lighting service wires and the lighting units. They found it an economical plan that promoted cordial relations and civic pride between City Officials, Merchants, General Public, Chamber of Commerce and the RAILWAY AND LIGHTING COMPANIES. Ask the Electric Railway Executives in Maysville and they will tell you of INCREASED TRAFFIC on the streets lighted as shown. Think it one, you Executives striving for more business and justly needed higher fares. Then remember that we are ready to help you sell this idea to YOUR CITY. Get in touch with us.

Electric Railway Equipment Co.
Cincinnati, Ohio
New York: 30 Church Street

Main Business Street

Day View Main Business Street

Night View Main Business Street

Combination Railway and Lighting Poles

Save Men, Minutes and Money with the Any-Weather Collins Automatic Non-Splashing Track Switch

Long before track labor was so scarce and so expensive the Collins Automatic Track Switch cost less than man-power or boy-power.

But that was only one of several sterling reasons for its adoption by scores of electric railways.

A second reason was that it increased the *car capacity* of heavily loaded track because of its superiority in speed to hand switching, whether from the street or from the car.

A third reason was that the Collins Switch proved ever-operative and practical—no failures from dirt, water or ice; no splitting of switches and no splashing in its wake no matter what the condition of the street.

Today the Near-Side Operation of Petewit and Safety Cars

Furnishes new reasons for using the Collins switch, since the motorman on these cars must leave the platform as rarely as possible in order that he may further the safety of his passengers and avoid opening the front doors in bad weather no longer than is absolutely necessary for the handling of the passengers. Collins Automatic Track Switches are in wide use—from single switches in small towns to complete tower-controlled systems for the most complex truck layouts.

A generation of success in signal specialization
stands back of United States equipment.

United States Electric Signal Company
West Newton, Massachusetts

Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Services Supply Co., Salford, England

Get Two-Track Results with One-Man Cars Through U. S. Electric Trolley Contact Signals

Whether you are operating out on the single-track extensions of your city lines or on one-track cross-country highway routes, you want to do something—and do it soon—to meet the two fold menace of higher costs and automobile competition.

Higher costs you can avoid by the use of the safety car, but the safety cars alone won't hold and create traffic unless you run them on short, attractive headways.

And the inexpensive, *immediate* way to make safety car service on single-track lines *safe,* as well as frequent, is to

Equip Your Line With U. S. Trolley Contact Signals

The records of thousands of U. S. signals operating for big cars and heavy service are a sufficient guarantee that they will meet any conditions *you* may have to set for the operation of small cars in light service. Send us a diagram of your track layouts and a statement of the schedule desired. We'll take the next step gladly.

A generation of success in signal specialization
stands back of United States equipment.

United States Electric Signal Company
West Newton, Massachusetts

Representatives:
Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Services Supply Co., Salford, England

reducing operating
and maintenance costs
on the country's
electric railways with
The
ERICO
Portable
Railbonding
Apparatus

Speed Safety Economy

Setting new speed records in rail bonding

Today one of the most important problems confronting railway executives in charge of operation is how to keep maintenance costs down to the lowest possible point.

Maintenance never ceases. Maintenance costs can not be eliminated but they can be appreciably reduced by cutting out lost motion and speeding up operations.

Take railbonding for example. With the Erico Railbonding Apparatus an average of 100 bonds per day is easily maintained. The Erico not only sets new records for high speed bonding, but its mechanical construction makes it logical equipment for every progressive electric railway.

The welder weighs but sixty-five pounds and the combined outfit can be easily removed from the track by two men.

In construction the Erico is extremely simple. It contains no rotating parts. No finely adjusted parts—nothing to get out of order.

And, finally, its cost is low.

This equipment may be seen in actual operation at the Atlantic City Railway Convention.

Write today and ask for complete information and prices.

THE ELECTRIC RAILWAY
IMPROVEMENT CO.
CLEVELAND, OHIO

ACKLEY BRAKES
Found The World Over

Lightness Compactness Efficiency

all in the

Ackley All-Steel No-Staff

Pressed Steel Pedestal

Double eccentric, smooth Winding Drum

Direct drive from Drum to Brake Shoe

No Sprockets

Height . . . . . 34½ in.
Depth of Gear Housing . . . 4¾ in.
Width . . . . . 10½ in.

Electric Steel Gears

Adjustable Check Chain System

Your choice of three gear ratios

No chain cutting

Net weight, 75 lbs. including chains and sheave

Simplest to install

For either Heavy or Safety Cars

Booth No. 13—American Electric Railway Convention

ACKLEY NO-STAFF TRADE BRAKE MARK

ACKLEY BRAKE & SUPPLY CORPORATION
G. S. ACKLEY & COMPANY, REPRESENTATIVES
50 Church Street, New York, U.S.A.
Agencies throughout the World
Cable address "Acklebrake"

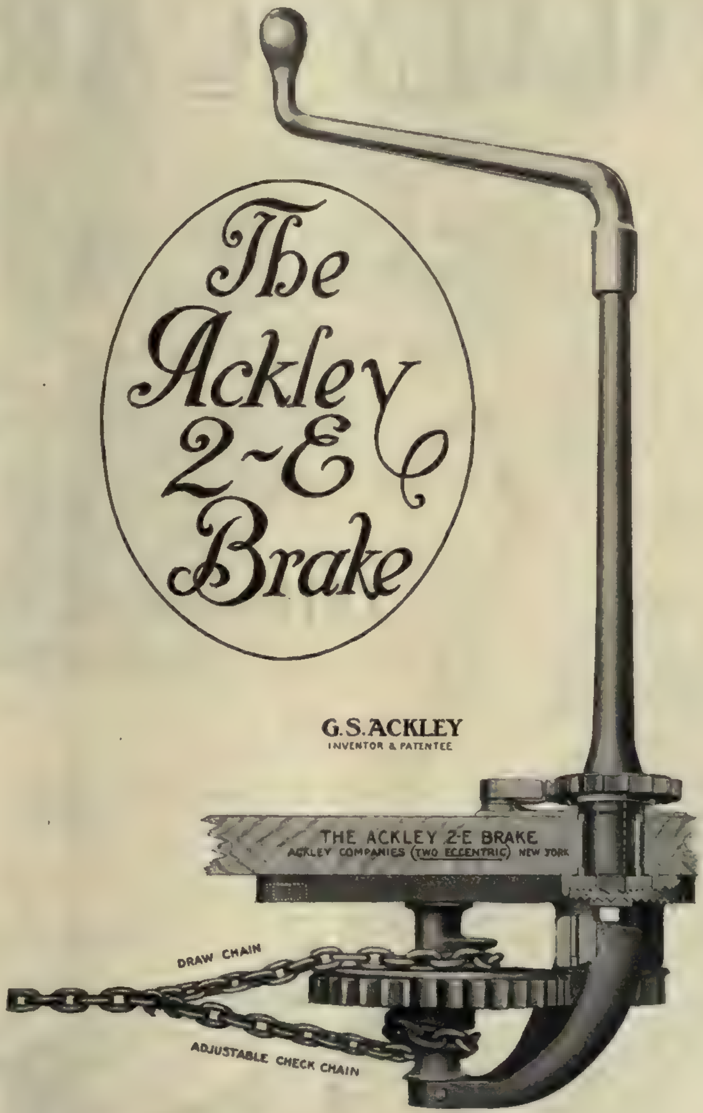
ACKLEY 2-C BRAKE

ACKLEY BRAKES
Found The World Over

The Ideal Staff Brake

Equipped
with
Automatic
Check Chain

The
Maximum of
Efficiency and
Safeness



The Ackley 2-E Brake

Adjustable to Any Angle of Pull

Requires
Minimum
Amount of
Space

Easily
and Cheaply
Installed

Weight, 35 lbs.

For All Types of Cars

Booth No. 13—American Electric Railway Convention

ACKLEY NO-STAFF TRADE BRAKE MARK

ACKLEY BRAKE & SUPPLY CORPORATION
G. S. ACKLEY & COMPANY, REPRESENTATIVES
50 Church Street, New York, U.S.A.
Agencies throughout the World
Cable address "Acklebrake"

ACKLEY 2-E BRAKE TRADE MARK THE ACKLEY COMPANIES N.Y. U.S.A.

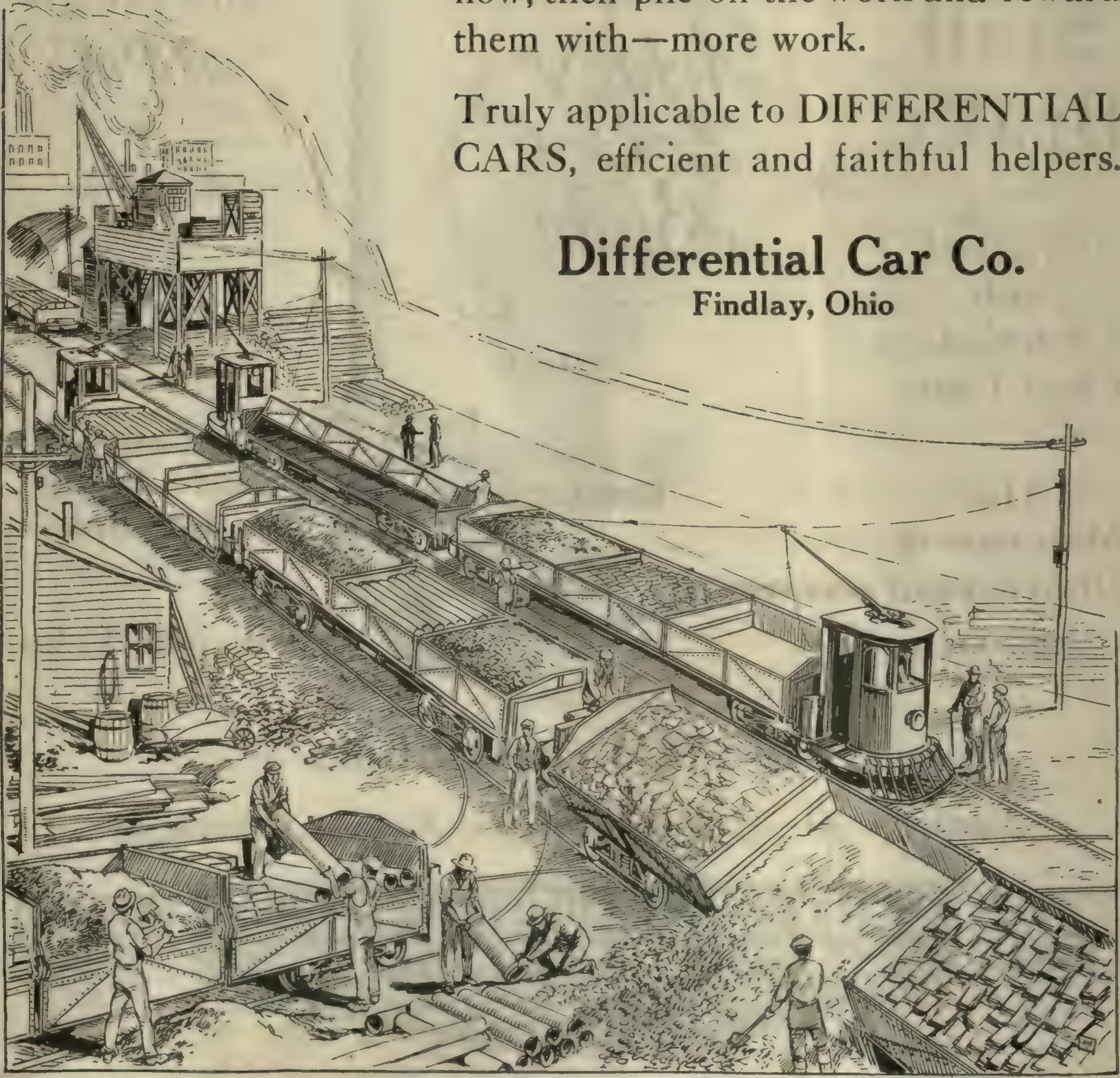
DIFFERENTIAL

UTILITY CARS

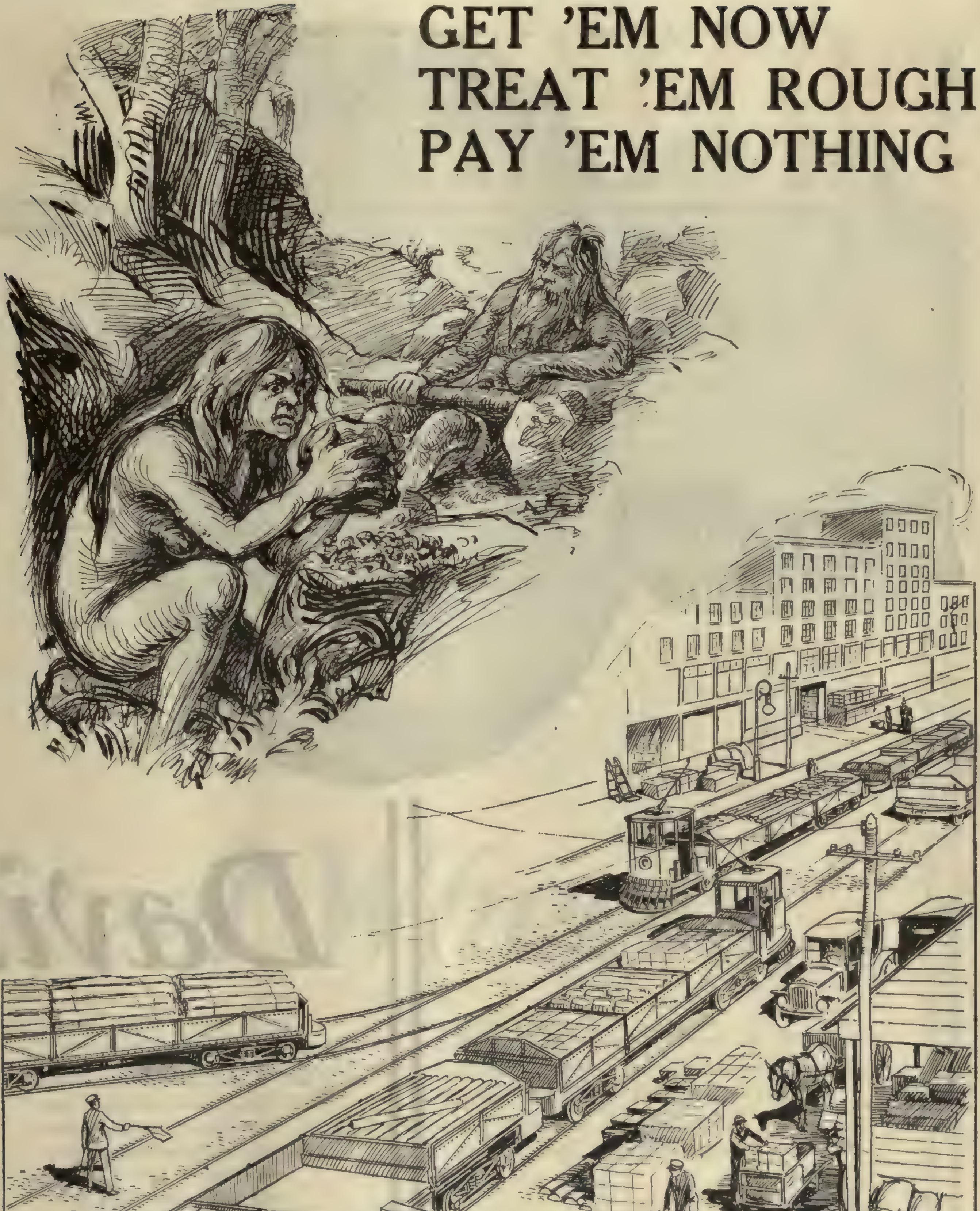
For getting the work done, you can't beat "cave-man philosophy"—Get 'em now, then pile on the work and reward them with—more work.

Truly applicable to DIFFERENTIAL CARS, efficient and faithful helpers.

Differential Car Co.
Findlay, Ohio



GET 'EM NOW
TREAT 'EM ROUGH
PAY 'EM NOTHING



Davis

Davis Steel Wheels are today being used on more than 350 roads. For interurban service, for suburban service, for city service, for heavy haulage and high speed, wherever electric railway cars are used, they are the standard wheel for safety, economy and long wear.

One Wear—Continuous Service

Davis Steel Wheels give their full mileage with no turning. Turning down a wrought steel wheel to get full mileage means (1) expense of turning (2) a large investment in shop and tools (3) cars out of service while wheels are being turned (4) adjustment of car and coupler heights to suit varying diameters and (5) replacement of brasses.

Multiply these items by the number of car wheels and you will gain an appreciation of the economy of Davis one-wear steel wheels.

For electric line service the Davis wheel also eliminates varying motor loads, due to its one wear, one-diameter feature; the decreased weight effects a saving, especially under high starting accelerations, and slippage is decreased because the co-efficient of friction is much higher than that of other wheels.

The final test of service shows that Davis Wheels effect a decrease in worn, damaged and defective wheels, an increase in mileage, a reduction in wheel costs, and continuous operation.

Steel Wheels

At this time, when the entire Electric Railway Industry is interested in the problems of mass transportation—in how to best keep cars in the maximum condition of operating efficiency constantly available for service, officials will find it advantageous to investigate the merits of Davis Steel Wheels. Every request for information will be complied with fully and promptly.

American Steel Foundries
1100 McCormick Bldg.
CHICAGO

OWNERS' FAITH *in* WHITE TRUCKS

THE following list of large investments in White fleets shows the faith large truck owners have in White equipment.

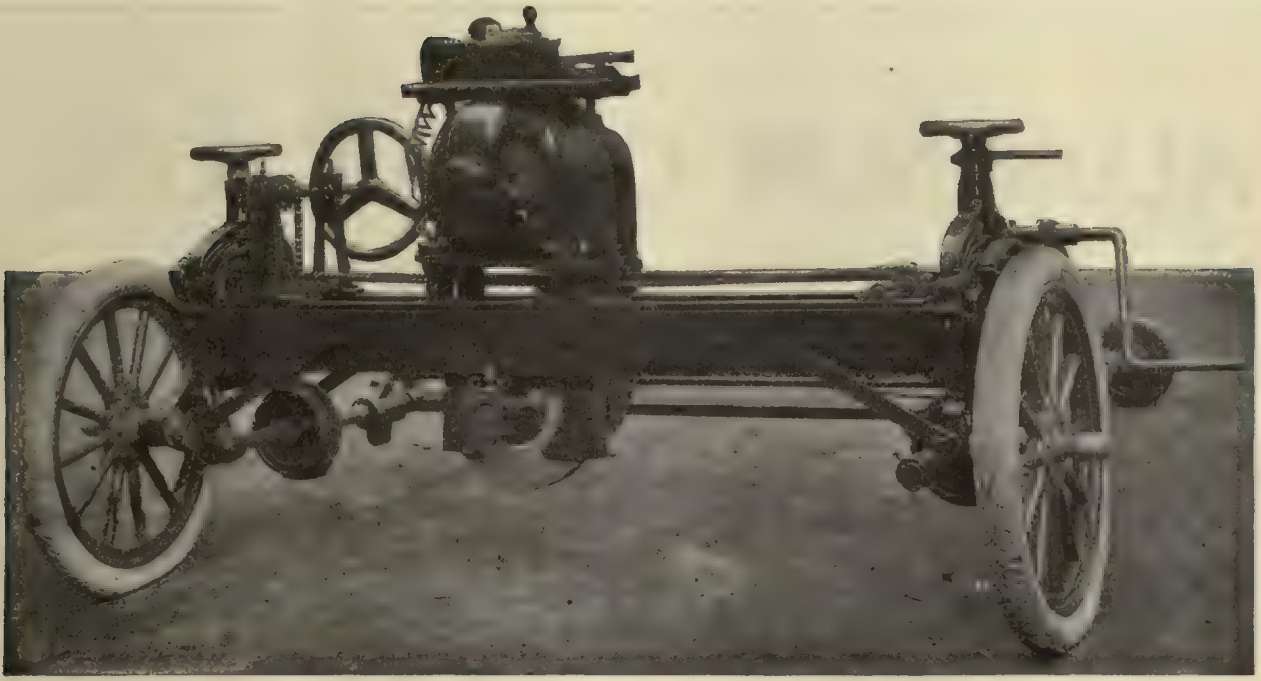
2 owners have invested over	$2,000,000		
4 owners have invested between	1,000,000	and	$2,000,000
5 owners have invested between	500,000	and	1,000,000
22 owners have invested between	250,000	and	500,000
82 owners have invested between	100,000	and	250,000

Experienced truck users *know* truck value in terms of earning power, through actual performance of one truck against another.

They *know* that White Trucks do the most work for the least money, and they back that knowledge by increasing their investments year after year.

The purchaser of one or a few trucks can safely follow their example.

THE WHITE COMPANY
CLEVELAND



Universal Rotary Track Grinder

UNIVERSAL ROTARY TRACK GRINDER

Enters Railway Field with a Smash and a Bang!

Demand for this grinder already outstrips that of any other ever placed on the market for a given length of time. Within a period of several months, orders have been placed for 40 Universal Rotary Track Grinders from a total of 25 operating companies.

This Record is largely due to its

1. Direct Drive Motor.
2. Tilted Grinding Wheel.
3. Outboard Bearing for Stability of Grinding Wheel.
4. Grinding Wheel which Travels in Guides.
5. Adjustable Outrigger.
6. Large Pneumatic Derail Wheels.
7. Wheel Arbor Bearings Adjusted on a Three Point Suspension.
8. Simple Adjustments.
9. Ease of Operation.
10. Low Working Economy.

In addition to the Universal Rotary, we are manufacturing the Atlas Rail Grinder which is low in first cost. It is adapted for removing surplus metal used in filling up low joints by arc welding.

For removing rail corrugations and grinding new or slightly cupped joints and special work the Reciprocating Track Grinder produces a quality of work which can not be equalled.

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia

Exclusive Agents—West

ATLAS RAILWAY SUPPLY CO.
Chicago, Ill.

ELECTRICAL ENGINEERING & MANUFACTURING CO.
Pittsburgh, Pa.

Exclusive Agents—New England

CHAS. N. WOOD CO.
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc.
77A Queen Victoria St., E. C.
London, England

ALUMINUM CONDUCTORS

STEEL REINFORCED

Lightness—with Strength

Aluminum Cable Steel Reinforced has made possible increased economies in high-voltage lines between the power source and the power use.

Aluminum Cable Steel Reinforced has saved money because its lightness—with strength—makes possible longer spans. With fewer towers and insulators comes a saving in first cost and in maintenance.

ALUMINUM COMPANY OF AMERICA
2400 Oliver Building
PITTSBURGH, U. S. A.

Electrical Conductor Handbook, new edition, will be off the press October 15. Your copy will be mailed to you if you order it now. Send your mailing address to us at our main office.

ALUMINUM COMPANY OF AMERICA

2400 Oliver Building

PITTSBURGH, U. S. A.

Safety Surface

From New York to San

PEACOCK

From cars weighing 7 or 8 tons to cars weighing 70 tons is a wide range. But there is a range of *Standard PEACOCK BRAKES* equally diversified—from the G type brake used on One-man cars to the 12 to 52 Peacock Improved Brake. The range of Peacock Brakes is as varied as the classes of cars. There is no item of car equipment so universally used —and there is no item that costs *so little to maintain,* or which returns so much, dollar for dollar, as Peacock Brakes. Their record stands approved by the large electric railways of this country.

Pittsburgh, full of steep hills, uses Peacock Brakes almost exclusively—over 1700 in service. Practically every car operated in hilly Kansas City is similarly equipped. Philadelphia has installed 2935. Chicago, with heavy cars and short headways, uses 6642. Baltimore, 2915; Washington, D. C., 1306; the Brooklyn Rapid Transit System uses today 5702 Peacock Brakes on practically every kind of rolling stock from work to Subway Cars. Even far-off Honolulu, Hawaii, has placed orders.

Type "G" Peacock

"The Peacock Staffless"

NATIONAL

BUFFALO,

and Subway Cars
Francisco are Equipped with
BRAKES

Peacock Brakes are *good* brakes because we make nothing but brake equipment. We stand back of every brake with a SERVICE in many cases as valuable as the brake itself.

You need not guess about the Peacock Brake. The results of the most exhaustive series of tests ever made for any kind of equipment are yours to consider. And we will go to the Convention prepared to explain, to amplify these at our Booth. Call and go over this data at your leisure.

Peacock Improved

BRAKE CO.
NEW YORK

Steel Twin Tie Track

Wood Ties or Steel Twin Ties?

From the Engineering Viewpoint

Basically—the question of satisfactorily handling mass transportation comes down to TRACK. Will the track stand up in service? Constant service? Increasingly fast, and *heavy* service? And the question of track service is largely a matter of TIES and track foundation reinforcement. Track that needs constant repair and track beds that must constantly be torn up will nullify the economies of the most expensive transportation—handling *equipment* that runs over them. From the engineering viewpoint—if Wood Ties Cost Nothing, Steel Twin Tie Track Would Be Lower in First Cost.

THE elimination of nearly half the concrete usually put in the Track Foundation produces a saving so large that it is hardly affected even if the wood ties in the comparative estimate are considered as worth nothing.

The difference in the track trench dimensions required for wood ties and those of the Steel Twin Tie Track designs show an actual difference of 50 per cent. The present cost of the concrete that is eliminated by Steel Twin Ties at Fifteen Dollars a Cubic yard amounts to Twelve Thousand Dollars for a mile of Single Track.

To save money in your track maintenance, figure concrete yardage; its cost; and compare bearing values on the concrete and on the subsoil. Over One Hundred Properties have decided that the answer is STEEL TWIN TIE TRACK.

The International

Manufacturers of Steel Twin

16702 Waterloo Road

and Mass Transportation

How will the Track Stand Traffic?

From the Mass Transportation Viewpoint

How will the track take *the pounding* of mass transportation? Will it stand up and let the cars ***keep moving?*** Will it bear the traffic of heavy interurban cars as well as the crowd-laden city cars—and do it without constant repair? Here is where the question of bearing and reinforcement comes in.

In Steel Twin Ties the economical distribution of Steel under the work a tie is called on to do takes the percentages of 63% for Bearing and 37% for Reinforcement.

The larger proportion of the Steel goes into the Three-Foot by Thirteen-inch Bearing Plates, which are Five-sixteenths-inch thick. Flanged sides provide for stresses in the plates and in combination with the Three-Foot-Long Bearing utilize all the Steel in them.

The smaller, but equally important, proportion goes into the Three-inch Channels, which weigh Four Pounds to the foot.

They space the rail so accurately that no gauge is needed in laying Steel Twin Ties.

They also reinforce the track foundation at Three-Foot Intervals.

This efficient distribution of Steel is the fundamental principle of permanent, proved construction at less first cost than wood tie probabilities.

Steel Tie Company
Ties and Crossing Foundations
CLEVELAND, OHIO

The Fabrikoid Process adds beauty and long life to fabrics; some heavy and rugged, others dainty as linen—all pliable, scuff-proof, stain-proof and water-proof

DU PONT FABRIKOID

—a beautiful upholstery that wears

MANY railways, the country over, have come to depend upon Fabrikoid for upholstery. It is so good-looking, it is so sanitary, it *wears* so well.

Fabrikoid comes in all popular colors and grains. Dust, grime and soot will not harm it. Long service will not cause it to lose its original beauty. It will not absorb moisture. You can wash Fabrikoid with soap and water.

Just write for samples and complete information.

DU PONT FABRIKOID CO.
WILMINGTON, DELAWARE

Branch Offices:

21 East 40th Street	New York City
Dime Bank Building	Detroit, Mich.
Gugle Building	Columbus, Ohio
McCormick Building	Chicago, Ill.
Merchants Bank Building	Indianapolis, Ind.
Harvey Building	Boston, Mass.
Chronicle Building	San Francisco, Cal.

Plant: Newburgh, N. Y.

FABRIKOID

JOHNSON FARE BOX COMPANY
RAVENSWOOD, CHICAGO, ILL.

JOHNSON
and METAL
Better Service

Shorter stops—faster schedules—better service—public good will—all these invariably follow the installation of Johnson Fare Boxes.

They make boarding the car simpler and quicker—avoid confusion and delay—speed up loading—decrease standing time—insure quicker car service. They enable the passengers to get to their destination in fewer minutes.

With Johnson Fare Boxes on your cars, the conductor has more time to look after the passengers' comfort, convenience and safety. Because the passenger deposits his own fare, the most potent source of argument and friction is wiped out.

These are only a few of the reasons why Johnson Fare Boxes insure *better service* wherever they are installed.

Any of the more than two hundred electric railways using them will tell you that these are facts, not theories. Write to them for verification—and to us for complete data.

JOHNSON FARE BOX COMPANY
RAVENSWOOD, CHICAGO, ILL.

FARE BOXES
TOKENS
Increased Revenue

The function of the Johnson Fare Box is to simplify the work of your conductors and to insure *maximum fare collection.*

These fare boxes give your conductors a positive, accurate and instantaneous check on all fares deposited. Each passenger is required to deposit his own fare, a feature which reduces the number of free rides to a minimum.

Johnson Fare Boxes are instruments that pay dividends from the day they are installed. Take *one* box on *one* car, for example. Assuming that the average fare today is 7 cents, suppose this box saves only one fare per trip. Ten trips per day will save $21.00 per month or $252.00 per year. At this rate it doesn't take long for Johnson Fare Boxes to pay for themselves.

Another way to look at it is this. The recovery of one 7 cent fare heretofore missed means a net profit of 7c free from all operating charges.

These are a few of the reasons why Johnson Fare Boxes insure *increased revenue.* Electric Railways using them report as high as 3 to 10% increases in gross receipts.

The Johnson Engineering Department will gladly furnish complete data. *Write today.*

JOHNSON FARE BOX COMPANY
RAVENSWOOD, CHICAGO, ILL.

JOHNSON FARE BOXES

—on more than 200 electric railways

The fact that Johnson Fare Boxes are now used on more than 200 of the country's electric railways is one of our strongest arguments in favor of this efficient method of fare collection.

These Roads use more than 1,000 JOHNSON FARE BOXES

- Public Service Ry. Co.
- United Railways Co. of St. Louis
- United Ry. & Electric Co.—Baltimore
- Third Ave. Ry. Co.
- Twin City Ry. & Lt. Co.
- Eastern Massachusetts Street Ry. Co.

More than 500 JOHNSON FARE BOXES on these roads

- Connecticut Co.
- Capital Traction Co. and Washington Ry. & Lt. Co.
- New York Rys. Co.
- United Railroads, San Francisco
- Seattle Municipal Street Railway.
- International Railway Co.—Buffalo
- Los Angeles Ry. Corporation

More than 100 JOHNSON FARE BOXES used here

- Denver Tramways Co.
- Omaha & Council Bluffs St. Ry. Co.
- San Francisco—Oakland Terminal Rys.
- Memphis Street Railway Co.
- Northern Texas Traction Co.
- Dallas Railway Co.
- Municipal Ry. of San Francisco.
- Houston Electric Co.
- San Antonio Public Service Co.
- Tacoma Railway & Power Co.
- New York State Rys. (Rochester, Syracuse and Utica)
- Tri-City Railway Co.
- New Orleans Ry. & Lt. Co.
- Michigan Ry. Co.
- St. Joseph Ry., Lt., Heat & Power Co.
- Brooklyn City R.R. Co.

171 Other Railways

Besides the above listed properties there are 171 other electric railways using up to 100 Johnson Fare Boxes.

What Johnson Fare Boxes have accomplished for these roads they will accomplish for you. Write today for complete data.

JOHNSON FARE BOX COMPANY
RAVENSWOOD, CHICAGO, ILL.

The World's best Lubricants

GALENA QUALITY

YOUR BUSINESS
—to get lubrication at its best

That correct lubrication is essential to efficient operation is a truth too well known to need comment. It is a factor of such importance that earnings are affected far beyond the cost of the lubricants themselves.

The effects of faulty lubrication are shown in many ways; in hot boxes, time losses, withdrawal of equipment, repairs and depreciation due to general wear and tear. Frictional power losses alone often run as high as twenty per cent. All of these add to the cost of lubrication.

Correct lubrication cannot be secured simply by the application of oil and good intentions—it is a scientific proposition that is governed by immutable laws. Right oils and right methods must be used to secure satisfactory results. The unusual and varying conditions presented in railway lubrication work makes this imperative.

Galena Quality Oils and Galena Service provide the surest and safest means of securing highly efficient and economical operation. They are inter-dependent and work hand-in-hand in the solution of lubrication difficulties by installing and carrying through the successful methods perfected by this company.

Galena methods are not experimental; they are achieving daily records on hundreds of electric railways throughout the United States and are proving by actual performance that they represent lubrication at its best.

There is a Galena Lubricant for every Railway or Power House use.

TRIGRAM G S O C TRADE MARK

THE GALENA-SIGNAL OIL CO.

NEW YORK FRANKLIN, PA. CHICAGO

Offices in all principal American Cities

LONDON BUENOS AIRES PARIS

GALENA SERVICE

The Significance of Galena Quality

A good lubricant must possess in proper proportion various physical properties, to render greatest efficiency. An oil that is suitable for one purpose may break down entirely when used for another.

Galena lubricants are built especially for railway use and are compounded from special stocks by exclusively Galena processes, which begin where approved refinery methods leave off.

The remarkable durability of Galena oil film is due to the exceptional quality of the stock used and its care and treatment in compounding, which reinforces it with extra strength and vitality. Comparatively, it has the same degree of strength over ordinary oil film that vanadium steel has over ordinary steel.

This further compares with its purity; Galena Oils are free from all impurities and protect and preserve journals and bearing surfaces. They withstand the highest speeds and bear the heaviest loads without a break. They have never been equalled in mileage tests.

Galena Quality, therefore, does not mean simply good quality; it is the accepted quality standard on the world's railways, having gained this distinction by matchless performance records in fifty-one years of actual service.

Galena Quality Is Our Bond
and Your Security!

TRIGRAM
G S O
C
TRADE MARK

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

The Advantages of Galena Service

The Galena Service organization is probably more generally known in railway circles—both steam and electric—than any similar body in existence.

Mechanical men, familiar with every phase of railway operation, thoroughly trained as lubrication specialists and backed by the knowledge of this company's half century of experience, they are known by their works—their accomplishments.

Co-operation—the practical kind—is what this service brings to the operating departments of railroads. Co-operation that works for efficiency and economy and invariably succeeds in securing highly satisfactory results. There are no instances where Galena Service has failed to produce such results.

Under present conditions there are plenty of difficulties facing railway officials without the addition of the lubrication problem. Yet there is scarcely an item of more importance, as successful operation is absolutely dependent upon proper lubrication.

Galena Service lifts this burden from the shoulders of the busy executive and assumes the responsibility of the lubrication question. It provides the means and methods by which efficient and economical lubrication is assured and in many ways proves a valuable aid in creating operation betterments that reflect materially in the earnings.

When Galena Service Goes In—
Lubrication Troubles Go Out!

TRIGRAM
G S O ©
TRADE MARK

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
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LONDON BUENOS AIRES PARIS

The World's best Lubricants

OUR BUSINESS
—the lubrication of railways

This company does not dabble in railway lubrication; it is our specialty—a business to which the entire resources of the organization are devoted.

At no time in the more than a half-century of business life have we been so well qualified to render exceptional service to customers than at the present.

Millions have been invested in oil stocks to insure an uninterrupted supply; stations and warehouses have been built to facilitate distribution. Sales offices and service representatives in practically every part of the country contribute to the prompt and efficient handling of the customers' business.

With manufacturing, testing and laboratory equipment brought to a stage of perfection heretofore unattained, the uniform high quality of Galena products is assured.

The further extension and development of the Galena Service Department places at the disposal of our patrons a helpful, practical co-operation that is invaluable in securing operating betterments.

These are but a few factors in evidence of this organization's responsibility and ability to offer a lubricating service of manifold advantages, that is today in successful operation on hundreds of American railways.

Galena leadership didn't "happen"—
it was earned by honest service!

TRIGRAM G S O C TRADE MARK

THE GALENA - SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
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GALENA SERVICE

Electric Transportation

Yesterday
To Day
and
Tomorrow

1890

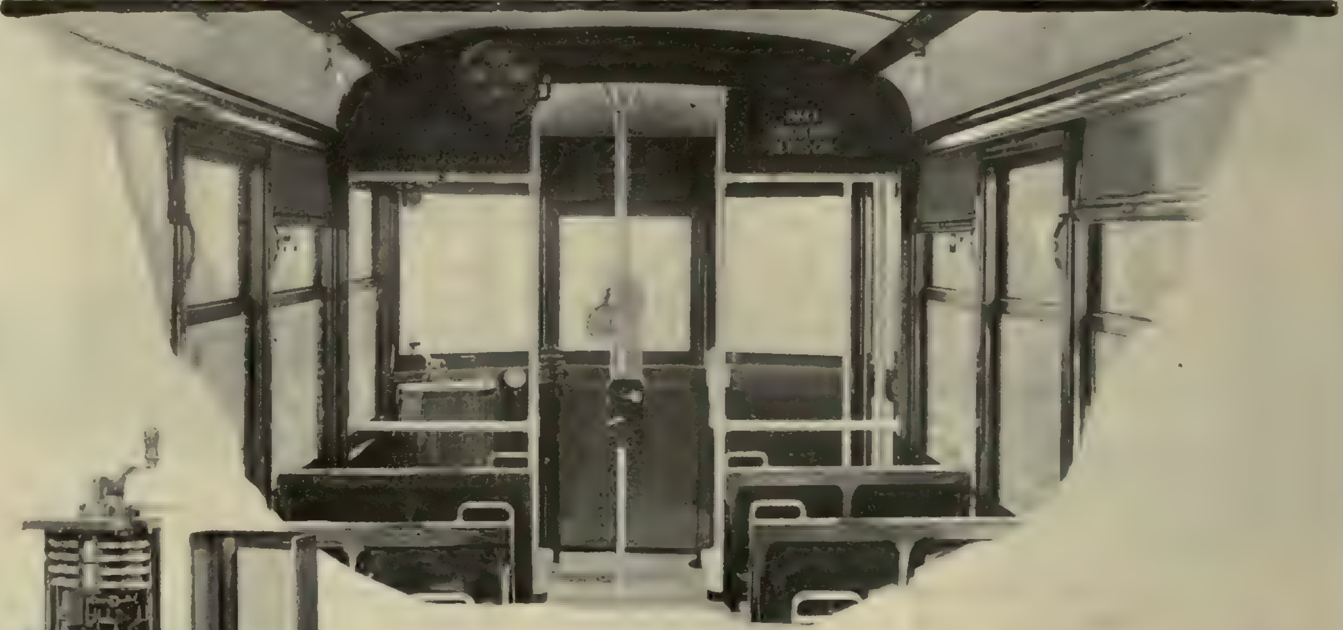
1895

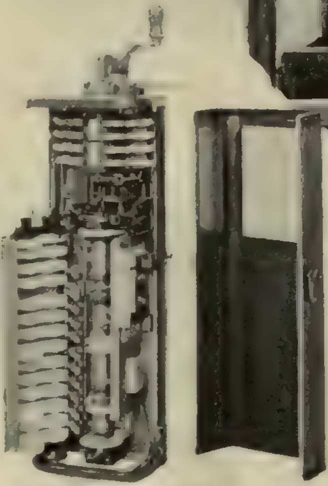
1902

At a time when advances have been made in most forms of transportation, it is satisfying to know that electric traction equipment has been developed to perform immeasurably greater and better services.

Summed up in the following pages is the part played by the General Electric Company to help electricity attain and maintain this primacy.

"Simple to operate" is an expression of merit when describing car control apparatus.





"Old Reliable" K63 Controller

Main Finger for Type K Controllers.

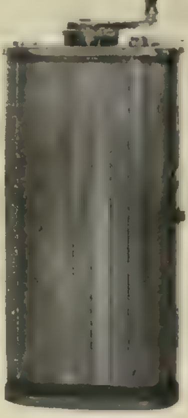
Control of the Individual Car

It is a fact in the history of electric railway equipment that Controllers are not vitally different from the ones manufactured a generation ago. In those days the magnetic blowout and arc shields or barriers were first made standard.

No better testimonial to the reliability of the G-E K-Type Controller could be offered than this generation of service and experience under the widest variety of conditions.

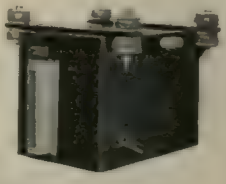
The K63 model shown above is a potent factor in the high mileage and low upkeep of the modern safety car.

Segment Body Casting Showing Removable Wearing Tip.



K63 Controller

Ratchet Switch as It Is Mounted in Bottom of Controller.



Line Breaker for Mounting Under Car.

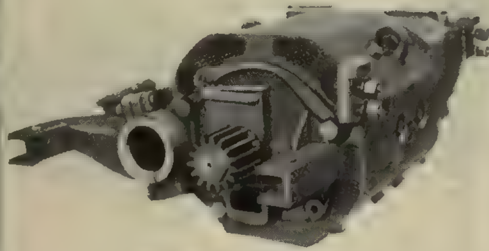
25-S

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

The building of machinery to secure greater motor power within the same car space is an accomplishment of exceptional importance in electric railroading.

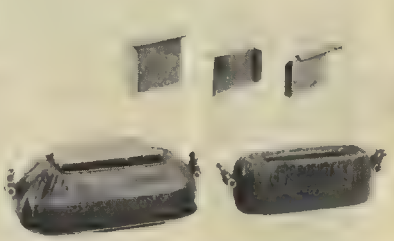


G-E 247 Ventilated Motor

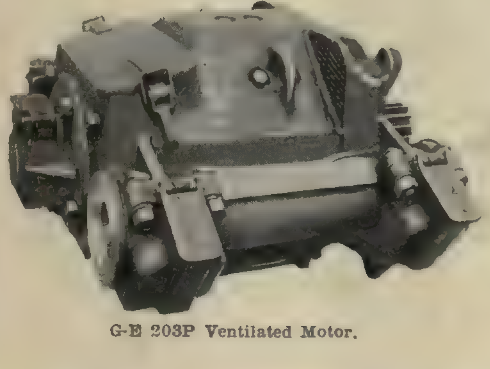
Make Your Present Cars Do More Work

Commutating poles and self-ventilation were not unknown to the earliest inventors of electric railway motors. But it was not until General Electric Company engineering was asked to meet the severe conditions encountered in congested city service that these principles were converted into successful practice.

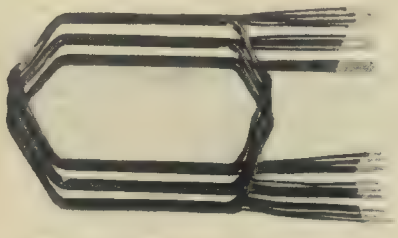
These two improvements incorporated in the modern ventilated commutating pole motor produces higher output per pound of weight.



Field Coils and Pole Pieces as Supplied When Ordered from Catalogue.



G-E 203P Ventilated Motor.



Armature Coils as Prepared for Supply Shipments.

25-87

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Schenectady, N.Y.

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all large cities

The problem of the congested Surface Railway is to make every foot of track in the traffic gathering area work to its full capacity.

PC5. Motor Controller Complete.

C-129. Master Controller. Light in Weight and Requiring Minimum Platform Space.

Multiple-Unit Control to Increase Track Capacity

It was Sprague Multiple-Unit Control that made train operation possible, practicable and successful. It banished the steam locomotive from the elevated railways and made possible longer trains, shorter headways and higher speeds for the underground railways. The final result was the electrification of the heavy rapid transit suburban lines of such great trunk systems as the New York Central and Hudson River Railroad.

PC5. Motor with Cover Off—Arc Chute Swung Down—Showing Accessibility for Repairs and Inspection.

But these applications to right of way electric service did not exhaust the possibilities of G-E Multiple Unit-Control. The need to route an increasing number of cars over a street track of unchangeable length brought a new field and new problems.

The adaptation of PC-5 control to three-car surface trains in Boston is typical of the possibilities of Multiple-Unit Control in raising track capacity. The increase has been secured despite the reduction in the number of transportation units from thirty to fifteen an hour.

25-55

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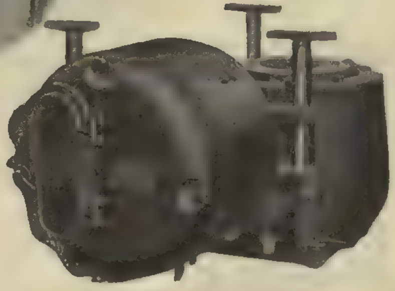
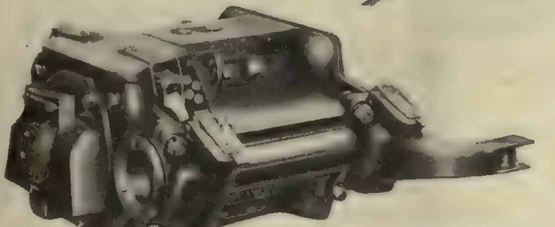
all large cities

The success or failure of any motive mechanism is dependent directly upon the reliability of its component parts.

Safety Cars in Terre Haute, Indiana.



CP25. 10 Ft. Air Compressor



G-E 264. Sleeve Bearing Motor.

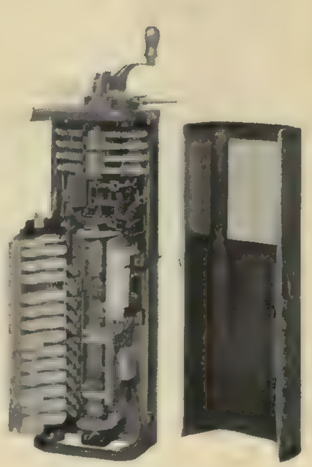
And So With the Safety Car

Paralleling the great success of the Safety Car is the success of the G-E 258 and G-E 264 motors, the K 63 Controller and the CP 25 Air Compressor, which are standard equipment on the vast majority of these cars.

The G-E 258 ball bearing motor and the G-E 264 sleeve bearing motor have stood up so well under the higher rates of acceleration and varying loads that they are now widely installed on quadruple equipment to secure faster schedules.

But no safety car can give the utmost in shopless or revenue miles per annum without a good air compressor. The constant use of air for door, step and safety interlocking demands greater reliability than air brake operation alone, and this demand is best filled by the CP-25 Compressor.

G-E 258. Ball Bearing Motor



K63. Controller.

25-89

General Electric Company

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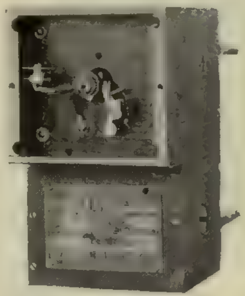
Schenectady, N.Y.

Sales Offices in
all large cities

Saving man-power by installing automatic control in substations is one way of equalizing the rising costs in electric railway operation.



Under Voltage Relay.

Automatic Means Economic

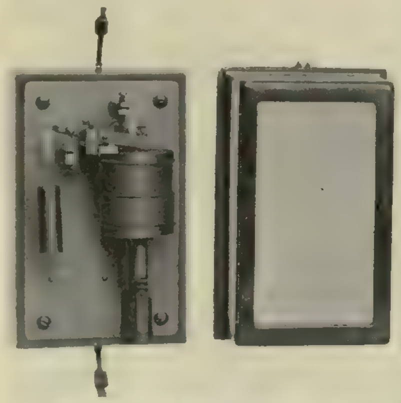
The first automatic railway substation in America was installed on the Elgin (Ill.) and Belvidere Electric Railway six years ago. It was G-E equipped.

For this and other interurban railways the automatic substation permits a great saving in labor. Through higher voltage and better regulation the automatic raised schedule speed and improved car lighting.

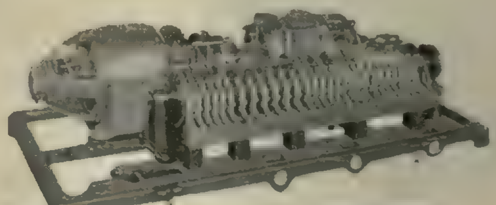
Installed on city railways the results are even better. By automatizing seven stations the Des Moines City Railway, also a user of G-E apparatus, cut down power cost, seven distribution centers replacing three, new feeder cables were made unnecessary for five years and some existing copper was actually taken down and sold as excess. Transmission losses were cut in half and schedule speeds raised. These helped to offset expense increases enormously, and reduced the road's dependence on the human element.

Today there are 12 G-E automatic substations in operation on the Des Moines City Railway lines.

Underload Relay.



Voltage Relay for Generator or Rotary Converter Starting



Motor Driven Master Controller

25-90

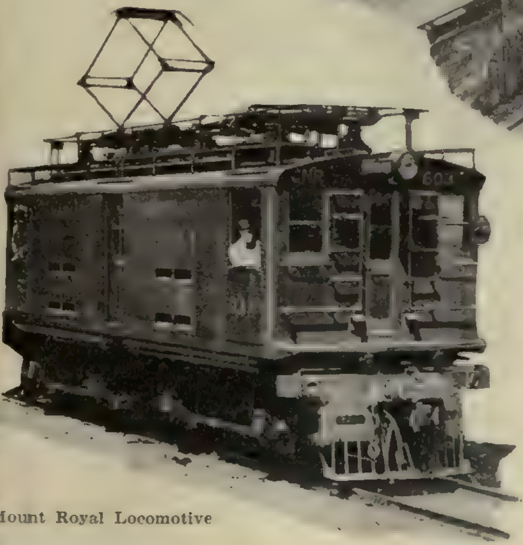
General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

In making city terminal tunnels smokeless, electrification has multiplied capacity where the cost of a new line would be prohibitive.

Mount Royal Tunnel —Canadian Northern Railway



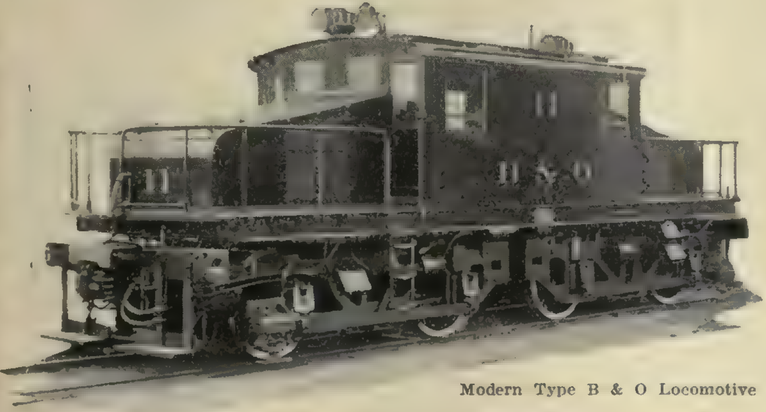
Mount Royal Locomotive

The Pioneer Made Good

Heavy electric locomotive operation 25 years ago seems almost incredible now. But it was on May 1, 1895, the Baltimore and Ohio began operating 3.7 miles of route at Baltimore with three locomotives designed and built by the General Electric Company. They ended the smoke nuisance and increased train frequency.

The three pioneers served staunchly until the period 1910-12 when they were replaced by heavier locomotives for the 2840-ton trains of those days. The G. E. pioneer locomotives proved so effective that their successors were also G. E.

It is a big step from the original trio of 500-600 volt locomotives to the 2400-volt D.C. machines now operating under Montreal's famous Mount Royal for the Canadian Northern Railway. Both types represent the best of their day — and both are G. E.



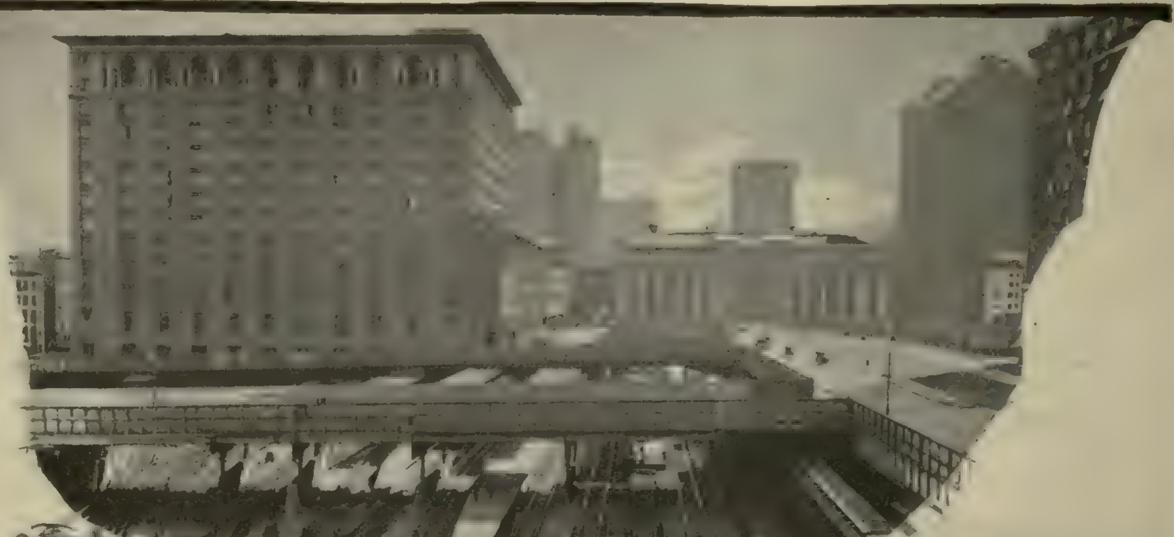
Modern Type B & O Locomotive

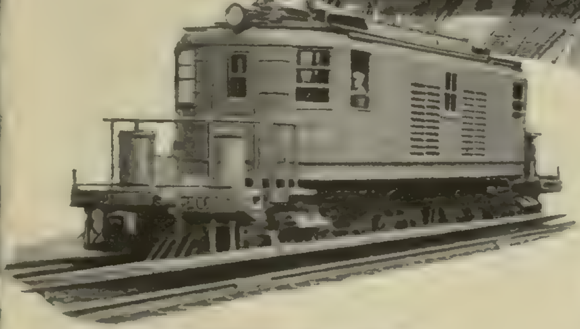
General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

It is not merely location, but a transportation system which meets all requirements for expansion that gives great cities their priority.





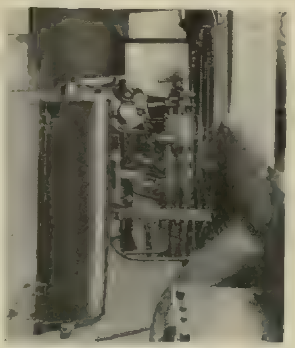
The N. Y. C. Gearless Type Locomotive.

Why New York's Northern Suburbs Flourish

The New York Central Railroad's electric zone was the first great electrification of its kind. Its record of reliability after nearly fourteen years of service is a real tribute to General Electric Company engineering which devised the then novel gearless locomotive.

Detail records given out for the year of 1919 by New York Central officials show over 45,000 miles of service per locomotive detention (with 73 locomotives) and over 69,000 miles per multiple unit train detention.

The increase in motor cars from the original 125 in 1907 to more than 240 in 1920 shows that electrification has fostered the growth of suburban traffic out of the premier city of the New World.



One Corner of Locomotive Cab Showing Control.

Gearless Motor Armature as Mounted on Axle.

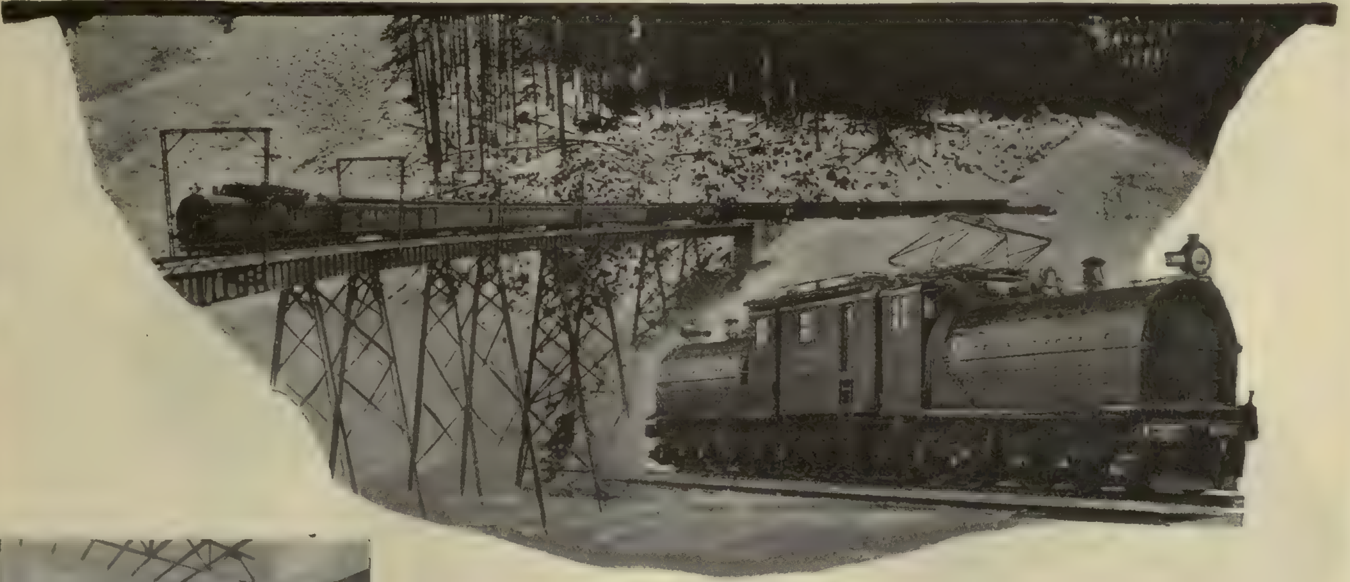
25-92

General Electric Company

General Office
Schenectady, N.Y

Sales Offices in
all large cities

High tension Direct Current electrification recognizes few limitations. No route is too long, no country too rough and no weather too severe.

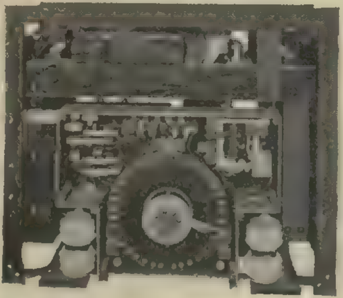


One of the C. M. & St. P. 3000 volt D.C. Substations

Climbing the Backbone of a Continent

When the Chicago, Milwaukee and St. Paul Railway decided to electrify the 217 mile Coast and Columbia Divisions at 3,000 volts direct-current, as first recommended by the General Electric Company for the original 440-mile Rocky Mountain and Missoula Divisions, the fact that high tension direct current had arrived was no longer open to argument.

The consumption of electrical energy on this great system during the period January-November 1919 was but 23.5 kw. hours per thousand gross ton miles of freight. This was due to the efficient design of the G-E equipment generally; and, also the application of G-E power indicating and limiting devices. These enable despatchers to keep the maximum demand within predetermined bounds by lowering the direct-current voltage at substations.



High Speed Circuit Breaker Operates Within Six Thousandths of a Second.

G-E Line Material. Twin Catenary Construction on Rocky Mt. Section.

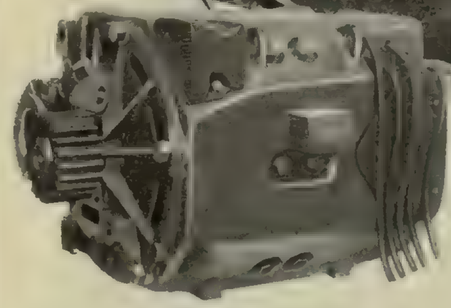
25-03

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

Health, housing and happiness—these three factors in the modern industrial life are dependent upon rapid transportation to counteract the evils of congestion.



G-E-237 Motor

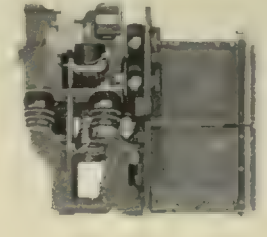
The World's Greatest Suburban Electrification

As long ago as 1896 the General Electric Company suggested the electrification of the many-miled steam rapid-transit systems of "Melbourne the Magnificent." But it was March 1913 before the contracts were placed by the State of Victoria, Australia.

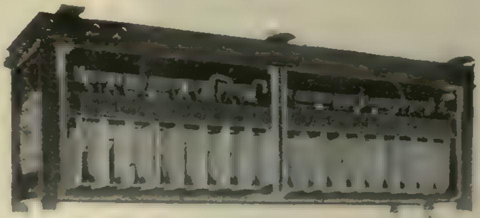
With the experience of the world to draw from, Merz and McClellan, the engineers, recommended the installation of 1500 volts direct current and the use of G-E motor and control equipment for the 400 motor cars and 400 trailers to operate over 335 miles of single track. They found the high-tension direct current was the lowest in both first and continuing costs.

Electrification at Melbourne is making possible a great increase in the steam schedule range of 13 to 18 miles per hour, thus helping to sustain the reputation of this metropolis as a city without congestion.

Pantograph Sliding Trolley.



Line Breaker



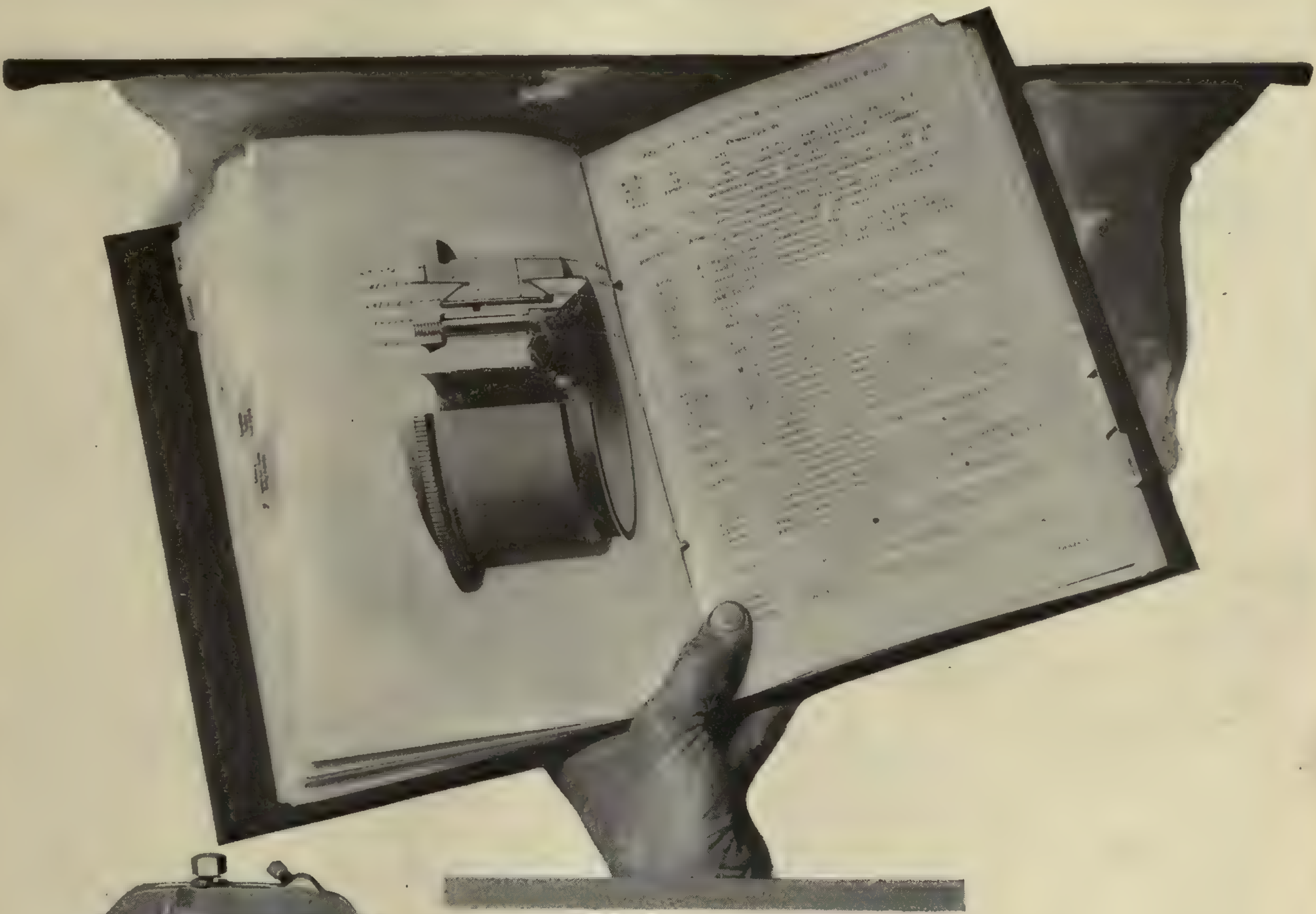
Controller

General Electric Company

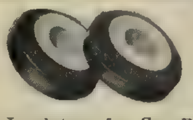
General Office
Schenectady, N.Y.

Sales Offices in
all large cities

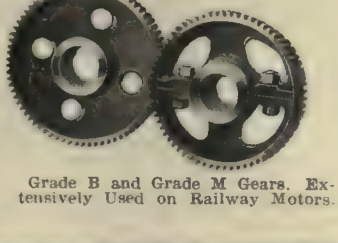
Every good railway man knows he cannot keep his equipment working at high efficiency if he picks renewal parts at random



Form N Removable Pan Trolley Frog.



Porcelain Insulators for Car Resistors.



Grade B and Grade M Gears. Extensively Used on Railway Motors.

Standardize on Good Material Then Stick to It—By The Book

The G-E Renewal Parts Catalog is the friend and ally of every wise master mechanic and purchasing agent of the hundreds of railways using General Electric Company equipment. They keep it within easy reach.

They also keep it up-to-date by inserting sheets that go out with all new equipments.

This loose-leaf book saves them hours of time. It is so arranged and indexed that a glance enables them to select exactly what they need every time they order.

G-E warehouses and shops all over the country fill those orders quickly.

That is G-E service.

40-164

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

Where to Get G-E Service—

Quick service is best obtained from the nearest G-E sales office, distributing jobber, or foreign representative

Works at Schenectady, N. Y. Ground area, 340 acres. Floor space, 5,800,000 square feet. Other manufacturing plants of the General Electric Company are located at Harrison, N. J., Newark, N. J., Lynn, Mass., Pittsfield, Mass., Erie, Pa., Cleveland, Ohio, and Fort Wayne, Ind.

For Business in the United States

G-E Sales Office	G-E Distributing Jobber
Alabama, Birmingham	Matthews Elec. Supply Co.
Alabama, Mobile‡	Matthews Elec. Supply Co.
Arkansas, Little Rock	
California, Los Angeles†	Pacific States Electric Co.
California, Oakland‡	Pacific States Electric Co.
California, San Francisco§†	Pacific States Electric Co.
Colorado, Denver†	The Hendrie & Bolthoff Mfg. & Sup. Co.
Connecticut, Hartford	
Connecticut, New Haven	
Connecticut, Waterbury‡	New England Eng. Co.
District of Columbia, Washington	National Elec'l Supply Co.
Florida, Jacksonville	Florida Elec. Supply Co.
Florida, Tampa‡	Florida Elec. Supply Co.
Georgia, Atlanta§†	Carter Electric Company.
Georgia, Savannah‡	Carter Electric Company.
Illinois, Chicago§†	Central Electric Company. Commonwealth Edison Co.
Indiana, Fort Wayne	
Indiana, Indianapolis	Indianapolis Elec. Supply Co
Indiana, South Bend‡	South Bend Electric Co.
Iowa, Des Moines	Mid-West Electric Co.
Kentucky, Louisville	Belknap Hardware & Mfg. Co., Inc.
Louisiana, New Orleans	Gulf States Electric Co., Inc.
Maryland, Baltimore	Southern Electric Co.
Massachusetts, Boston†	Pettingell-Andrews Co.
Massachusetts, Springfield	
Massachusetts, Worcester	
Michigan, Detroit	Frank C. Teal Company.
Michigan, Grand Rapids	
Minnesota, Duluth	Northwestern Electric Equip. Co.
Minnesota, Minneapolis†	Peerless Electrical Company.
Minnesota, St. Paul‡	Northwestern Elec. Equipment Co.
Missouri, Joplin†	
Missouri, Kansas City†	The B-R Electric Co.
Missouri, St. Louis†§	Wesco Supply Company.
Montana, Butte†	Butte Electric Supply Co.
Nebraska, Omaha	Mid-West Electric Co.
New Jersey, Newark‡	Tri-City Electric Co., Inc
New Jersey, Trenton	
New York, Albany‡	Havens Electric Co., Inc.
New York, Buffalo	Robertson-Cataract Elec. Co.
New York, Elmira	
New York City§†	E. B. Latham & Company. Royal Eastern Elec'l Sup. Co. Sibley-Pitman Elec. Corp.
New York, Niagara Falls	
New York, Rochester	Wheeler-Green Elec'l Sup. Co.
New York, Schenectady	
New York, Syracuse	Mohawk Elec'l Supply Co
North Carolina, Charlotte	Elec. Supply & Equipment Co.
Ohio, Cincinnati†	The F. D. Lawrence Elec. Co.
Ohio, Cleveland	Republic Electric Co.
Ohio, Columbus	The Erner & Hopkins Co.
Ohio, Dayton	The Wm. Hall Electric Co.
Ohio, Toledo	W. G. Nagel Electric Co.
Ohio, Youngstown	
Oklahoma, Oklahoma City†	Southwest G-E Co.
Oregon, Portland†	Pacific States Electric Co.
Pennsylvania, Erie	
Pennsylvania, Philadelphia§†	Philadelphia Elec. Co. Sup. Dept.
Pennsylvania, Pittsburgh†	Union Electric Company
Rhode Island, Providence	
South Carolina, Columbia‡	Perry-Mann Elec. Co., Inc.
Tennessee, Chattanooga	James Supply Company.
Tennessee, Knoxville	
Tennessee, Memphis	Electric Supply Company.
Tennessee, Nashville	
Texas, Dallas†	Southwest G-E Co.
Texas, El Paso†	Southwest G-E Co.
Texas, Houston†	Southwest G-E Co.
Utah, Salt Lake City†	Capital Electric Company.
Virginia, Richmond	Southern Electric Company
Washington, Seattle†	Pacific States Electric Co.
Washington, Spokane	
Washington, Tacoma	
West Virginia, Bluefield	
West Virginia, Charleston	
Wisconsin, Milwaukee	

For Hawaiian business address Catton, Neill & Co., Ltd., Honolulu

‡No G-E Office †Warehouse. §Service Shop

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INTERNATIONAL GENERAL ELECTRIC COMPANY, INC.

120 Broadway, New York, N. Y. Schenectady, N. Y. 83 Cannon St., London

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Australia: Australian General Electric Company, Ltd., Sydney and Melbourne
Belgium and Colonies: Societe d'Electricite et de Mecanique Procedes Thomson-Houston & Carels, Societe Anonyme, Brussels,
Bolivia: International Machinery Company, La Paz and Oruro.
Brazil: General Electric, S. A., Rio de Janeiro and Sao Paulo.
Canada: Canadian General Electric Co., Ltd., Toronto.
Chile: International Machinery Company, Santiago, Antofagasta and Valparaiso
China: Andersen, Meyer & Company, Ltd., Shanghai. International General Electric Co. Inc., (General representative of the Far East excluding China and Japan) Shanghai.
Colombia: Wesselhoeft & Poor, Barranquilla and Bogota.
Cuba: General Electric Company of Cuba, Havana.
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Mass
Transportation
Number

Transporting People in Large Numbers

THIS issue is devoted primarily to the discussion of a number of important city traffic problems. For this reason the name "Mass Transportation" has been selected. The topics treated are rapid transit lines, schedules, speeds, safety car, interurban, bus and commuter traffic on electrified steam railroads. The best way of hauling passengers in large numbers is one of the biggest problems in the transportation world today. We hope that this issue will help in its solution.

The Status of the Motor Bus

SO MUCH has been said and written about the motor bus as an auxiliary it is well to review the general situation. Undoubtedly the experience of the last few years has shown that the motor bus has a place in mass transportation and that its development has only been started. We believe also, however, it has been shown that the street railway companies are the proper agencies to develop the bus. The bus business is 90 per cent transportation, and logic and economics indicate that its development should be entrusted to competent transportation management.

If bus service is to be given in a city in which there is an electric railway system, it should be rendered by the electric railway because the latter already has a transportation organization that is acquainted with the needs of the community; because it can use the motor bus in its proper field and extend its use if developments warrant such extensions, and because thereby it can preserve its investment in street railways against pirate attacks by stock-jobbing motor bus companies.

At the present time motor buses cannot supplant the trolleys for the same length of haul, fare and operating conditions because the cost per passenger-mile is greater for the bus; because streets are not wide enough to accommodate the number of buses required for rush-hour traffic; because, inherently, large crowds cannot be handled with the same speed and comfort in small trackless vehicles, and finally because power is constantly becoming relatively cheaper for the railway due to the increasing cost of gasoline.

Motor buses have a certain field at the present time that should be recognized and developed. The motor bus makes transportation available in thin territory at a minimum capital cost. The motor bus can give a de luxe service on certain streets on which the trolleys cannot operate. The motor bus can give service on lines that operate only part of the year, such as lines to shore or summer resorts. The motor bus can be used on streets on which trolleys do not operate, to give added direct routes to passengers and to relieve surface traffic congestion. In every case the initial capital cost is lower but the operating cost will usually be higher than in the case of a trolley line, so that the rates of fare should be separate and distinct from that of the trolley line. We also question the advisability of free transfers as this would tend to maintain the old practice which companies had of extending lines without increasing fares.

The bus business is growing rapidly, but there remains room for great improvement in methods and vehicles. The motor bus is neither a street car nor an automobile and requires specialization in design and operation. Given the proper vehicle, the use of the bus then involves the fundamental problems of any system of transportation, and the street railway is the existing transportation authority to use the bus.

Strike Demonstrates Need for Rerouting

ONE of the interesting sidelights of the Brooklyn Rapid Transit strike was the discovery by the public of new routing possibilities. The improvised automotive passenger carriers and jitney buses sought out the short cuts immediately, being limited only by paving conditions. A large portion of the Brooklyn public also became acquainted with the just-opened extensions of the Interborough much more rapidly than if they had been solicited only by advertising, for people are astonishingly slow to try new though faster routes. However, the most striking change was that many people learned perforce that there was no sense in traveling along two sides of a triangle when they could reach their destination by the third side. Strange as it sounds, many learned for the first time that they were living directly opposite their work in the Thirties and Forties of Manhattan and that there was no reason why they should ride to downtown New York before going to uptown New York.

It is only fair to point out, however, that the public is not wholly to blame for failing to take the theoret-

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor
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ically shortest route indicated on the map of the railway system. The trouble in almost all of our large cities is that they developed from competitive systems, some of which have too much and others too little trackage for the inevitable shiftings and growth of population. As each constituent company has its own franchises, most logical treatment of the system as a unit in the light of existing conditions is attended with great difficulties, both within and without the organization. The legal staff is always concerned about any changes that may impair franchise interests, the owners of the underlying companies tend to oppose anything that diminishes the physical and operating value of their particular property, while a distrustful administration, like Mr. Milton's Cerberus, may have well-toothed jaws agape for any action that looks like "putting something over on the peepul." To all this there is but one solution that will go to the root of the matter and not hack around the twigs. That solution is to determine, first, the most satisfactory and economical routing and then work toward that.

Take Advantage of the Speed Fiends

WHEN we read of Ralph de Palma going 400 miles at the rate of 80 miles per hour we inevitably compare this with some speed experienced by ourselves in an automobile or train and then there wells up in our minds an envious desire to emulate de Palma and experience his sensations as we conceive them.

The American, thank heavens, likes speed. Why not capitalize more on this? Speed is a panacea for many railway ills. Earnings depend on the car-miles, but expenses, on the other hand, depend on the car-hours. If each car-hour can produce more car-miles than now expenses are relatively reduced. High schedule speed possibilities are at the base of the street railway structure. To increase schedule speeds involves such factors as rerouting, better track and rolling stock maintenance, double berthing, improved loading methods, use of skip-stops, signals, traffic regulation at street intersections, etc. It is not idle to predict that the transportation agency that offers the highest speed service will predominate in the future, and we believe that the possibilities of higher schedule speeds are not fully realized in the street railway industry.

Inherently the street car is capable of a schedule speed comparable to that of a private automobile due to its quick acceleration and the ease with which it is controlled, and it ought to be possible for the street car to attain the same average speed in city traffic. It is up to the traffic experts to give the vehicle opportunity to realize its speed possibilities. There is no fundamental reason opposing the speed increase, and we venture to say the present rate of speed is due only to the fact that transportation, like Topsy, "just growed" without any determined or intelligent effort to shape its growth as a co-ordinated unit that involves city planning, pedestrians, automobiles, street cars and everything that makes for congestion of traffic on the surface of streets. We heard a railway manager say the other day, "With just a reasonable degree of effort and at but little expense we increased our schedule speed in the congested districts from 2 to 6 m.p.h." The point is, higher speed is possible. Furthermore, it is a practical means of meeting jitney competition. Finally, it pays.

Certain Criticisms of the Federal Report Considered

COMMENTS on the report of the Federal Electric Railways Commission in the daily press, on the whole, have been very favorable. There has been a general recognition of the existence of an electric railway problem and a disposition to believe that the unanimous decision reached by the commission after its long and painstaking inquiry must be justified by the facts. The report is recognized not as an answer to the electric railway problem, but as an analysis with recommendations, which will prove a valuable aid in the various local situations.

But there has been some criticism of the report in the public press, and, from this, some criticism of the railways which cannot be minimized simply by neglecting it. What criticism there has been is usually based on the argument that the railways are saying their 5-cent franchise contracts should not hold, now that 5 cents is not profitable, whereas they fought for the inviolability of the contract when the 5-cent fare was supposed to be a money maker. There is also the statement that the present plight of the railroads was largely brought about by themselves because of overcapitalization, neglect to provide for depreciation, payment of excessive dividends in the past and the commitment of other financial errors.

Those who take the first position and claim that a franchise, which was accepted perhaps under conditions of four or five decades ago, is an inviolable contract which the company must carry out to the letter, and presumably forever if it is a "perpetual" franchise, should bear in mind certain things. One of these is that the railways also at one time believed that there was such a contract or bargain relation between themselves and the communities which they served, but this idea was largely dispelled when the states generally appointed public service commissions to regulate utility service and establish fair and reasonable rates therefor. At first and naturally the companies were opposed to such a radical change in their status, but the commissions were established, and the railways thereby changed from enterprises largely private in their nature to real public utilities. The change was undoubtedly desirable from all points of view, and the power of the state, acting through a commission to increase fares, in spite of limits mentioned in the original franchises and against the protests of the municipalities concerned, has been generally upheld by the courts.

But let us assume for the sake of argument that there is a franchise contract not rendered inoperative as to fare provisions by the creation of a utilities commission or by some other turn of events. Let us assume also, as is the case at present in practically all cities where the fare has not been raised, that owing to the increased costs of operation the company can supply transportation only at a loss. The railway becomes in consequence an unprofitable enterprise without credit, possibly in the hands of a receiver and utterly unable, of course, to make extensions or other improvements which the community really needs. In these circumstances, the only logical policy to follow for any city which wishes to grow and prosper is one which will put the utility on a real business basis. Thus it is obviously in the interest of every community to replace any "contract" to supply electric railway service at an unremunerative rate, if such a contract exists, with one which will enable the city to get what it wants upon payment of a reasonable fare.

As for overcapitalization and payment in the past of excessive dividends, they hardly affect a settlement which is based not on capitalization but on the value of the property used and useful in the public service. Recognition of this fact ought to do away with any misunderstandings on the relation of capitalization to income.

In its working out, some holders of stock may find that they have paid more than their holdings are now or ever were worth, and some will have to suffer therefrom. The sooner that railway companies, who need to do so, can effect such financial reorganizations as are necessary to convince the public that they are not paying excessive returns on some old investments, the better for both railways and public. But the prime factors the public is interested in, service and rates, are not affected by the nominal capitalization.

Finally, there is no doubt that past neglect of the companies to provide for depreciation and obsolescence has undoubtedly been a costly error, but it, too, is one from which the present stockholders rather than the public will suffer in connection with any fare based on the present value of the property.

Henry Ford's Price Bomb

HENRY FORD'S mid-September announcement of a return to pre-war prices is of almost as great significance to the majority of electric railways as it is to the majority of automobile manufacturers. We can let the latter do their own worrying, but what does it mean to us? Obviously, that electric railways in all but a few large cities will have to run their undertakings on strictly business principles. The idea that the sky's the limit as regards fare increases must give way to the cruel fact that a great many people don't have to ride and that they and many of their friends and acquaintances can walk or else ride in their own vehicles. No matter how widely railway operators may differ as to the results of fare increases, it hardly needs to be argued that there is an economic limit. That limit is not far away when less than $500 will buy a touring car which is sickeningly cheap to run and maintain. Of what value are service-at-cost or sliding scale fares if the patron may take such easy recourse to something else?

But, of course, if we are willing to run the electric railway on business principles we will see in this reduction of automobile prices only another incentive to give the community what it must have in any case, *i.e.*, co-ordinated, rain or shine transportation. It may be a novelty to us to see the individual manufacturing his own transportation, as it were. It's no novelty to the great baking companies which have succeeded in proving to millions of housewives that it is preferable to be able to buy their bread and cake at any time in any quantity than to go to the trouble of home baking, even if Madame Housewife does make fancy pastry now and then. Have we no parallel arguments to offer as to the difference between using an automobile every day and using it only where the electric railway is unavailable or inconvenient? If we have not, then we deserve to be condemned for expecting prosperity to come of itself.

Making Short Walking Distances Seem Long

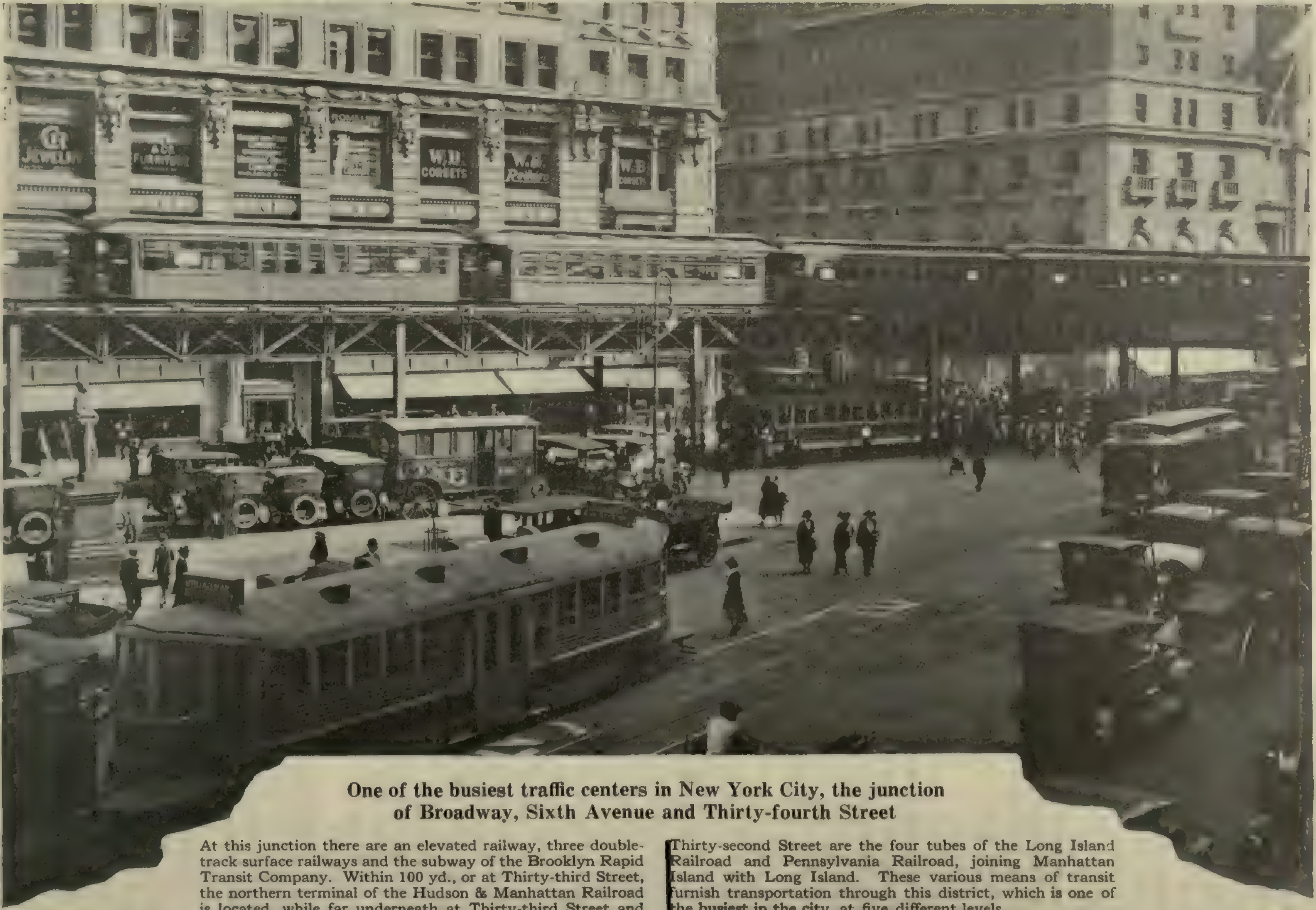
ONE of the most unfortunate results of the American unit-fare practice was that operators had no way of learning whether any noteworthy percentage of their public was riding easy walking lengths. However, as we have pointed out from time to time, higher schedule speed and frequency of service are also major factors in the development of short riding, although only a costly traffic survey would "legally" prove that statement on a unit-fare system. It seems fanciful to believe that a person traveling part of a mile would be influenced by a difference in schedule speed amounting only to the saving of 2 or 3 minutes, yet that is human nature, else why do thousands of people brave apoplexy or heart failure to catch one car when there is another right behind? The temptation to save time first and then dissipate it afterward appears simply irresistible. That frequency of service also builds up short riding will hardly be disputed, even by the most conservative, for the records of safety car operation on shorter headways can lead to no other conclusion.

Perhaps, if a philosopher or psychologist were asked to analyze the reasons that lead walkers to become riders, he might tell us that all distance is purely relative; that if a man were walking a mile against a procession of horse-drawn trucks he would not feel that he was going either a great distance or that he was moving much slower than the other traffic. Contrariwise, if a man is walking the same distance against a flight of fast cars or automobiles shooting by him at the rate of one a minute he will get the idea subconsciously that he is in the same class with the snail and the tortoise. What is more natural than that he should think the distance longer than it really is and that he should desire to board one of the vehicles whose speed is offending his ego? The capitalization of this principle is worth the careful consideration of every transportation purveyor.

Advantage to One Side Is Disadvantage to the Other

ONE strong point made by the proponents of the motor bus as an advantage which it possesses over the trolley car as a transportation agent is that there is no investment in property not easily removable, in case conditions should prove unfavorable. This is undoubtedly an important benefit for the operating company, as is shown by the ease with which certain municipal buses were taken off in New York City when the court ruled that they were operating illegally, and also when the city's Staten Island line was discontinued.

But how is this freedom of action so far as regards the community served? With an electric railway on the streets a community is pretty sure of continued service, as otherwise the company would have to abandon a large proportion of its investment. There is consequently much greater assurance to property owners that they may develop their property with the expectation of continued transportation service than if, owing to changed business conditions or other circumstances, the company could remove its entire investment in a day. These facts should be borne in mind by every city when considering the relative advantages of railway and bus service.



One of the busiest traffic centers in New York City, the junction of Broadway, Sixth Avenue and Thirty-fourth Street

At this junction there are an elevated railway, three double-track surface railways and the subway of the Brooklyn Rapid Transit Company. Within 100 yd., or at Thirty-third Street, the northern terminal of the Hudson & Manhattan Railroad is located, while far underneath at Thirty-third Street and Thirty-second Street are the four tubes of the Long Island Railroad and Pennsylvania Railroad, joining Manhattan Island with Long Island. These various means of transit furnish transportation through this district, which is one of the busiest in the city, at five different levels.

Capabilities of each transportation agency outlined. Effect of geographical distribution on transportation conditions. Trend in rapid transit development

Functions of Rapid Transit Lines in Cities

By Henry M. Brinckerhoff

of Parsons, Klapp, Brinckerhoff & Douglas, Consulting Engineers, New York

View on Broadway near Sixty-fifth Street, New York, where the Manhattan Elevated crosses the West Side division of the Interborough Subway

THE average visitor and most residents if asked how the people habitually travel about New York City will answer, "The vast majority on the subway and elevated lines, a smaller proportion on surface cars and a few on buses." This popular conception of the situation is largely due to constant newspaper discussion of subway congestion and the vivid impression made by long crowded trains following one another in quick succession at subway and elevated stations during rush hours.

Studying the statistics over a period of years, we find, on the contrary, that the surface car has borne the great burden of transporting the bulk of the citizens of our large American cities and that only in the past few years has even New York carried one-half of the total daily passengers on its rapid transit systems. This division of the growing New York travel during the past forty years is interesting, particularly as related to the population of the city. Other cities in the United States are now approximately the size that New York was thirty or forty years ago and, growing rapidly, they have ahead of them the probability of the same or similar traction problems.

In 1880 we find that 79 per cent of the passengers on the transportation lines of what we now call Greater New York were carried by surface cars, the population then served comprising about 2,000,000 people.

In 1900, twenty years later, the ratio was still 70 per cent surface car passengers to 30 per cent carried on rapid transit lines, while the population served had grown to about 3,500,000.

Almost another score of years brings us to 1919, when, after the expenditure during this latter period of more than $550,000,000 for subways, third tracking and extending elevated lines and additional rapid transit equipment, we find 43 per cent of the passengers still paying their nickels for rides on surface cars.

This condition is not peculiar to New York, as we shall see by a study of the history of transportation in other large cities.

In Chicago in 1906, with a population of about 2,000,000, 75 per cent of the revenue passengers were carried by the surface cars, and in 1919, with the population increased to about 2,800,000, 75 per cent of the people are still patrons of surface car lines.

In Philadelphia the Market Street elevated-subway line, with its free transfers between rapid transit trains and surface cars, makes a good showing in passengers carried per car-mile, but as part of the entire city lines it carries not more than 10 per cent of the passengers served by the whole system.

In Boston the surface-subway-elevated lines are so interconnected and the movement of passengers is so complicated by transfer privileges that a division is difficult. However, the proportion of the passengers actually handled here by surface cars is still large.

Turning to England, where the conditions of city development have been quite different, we see in London

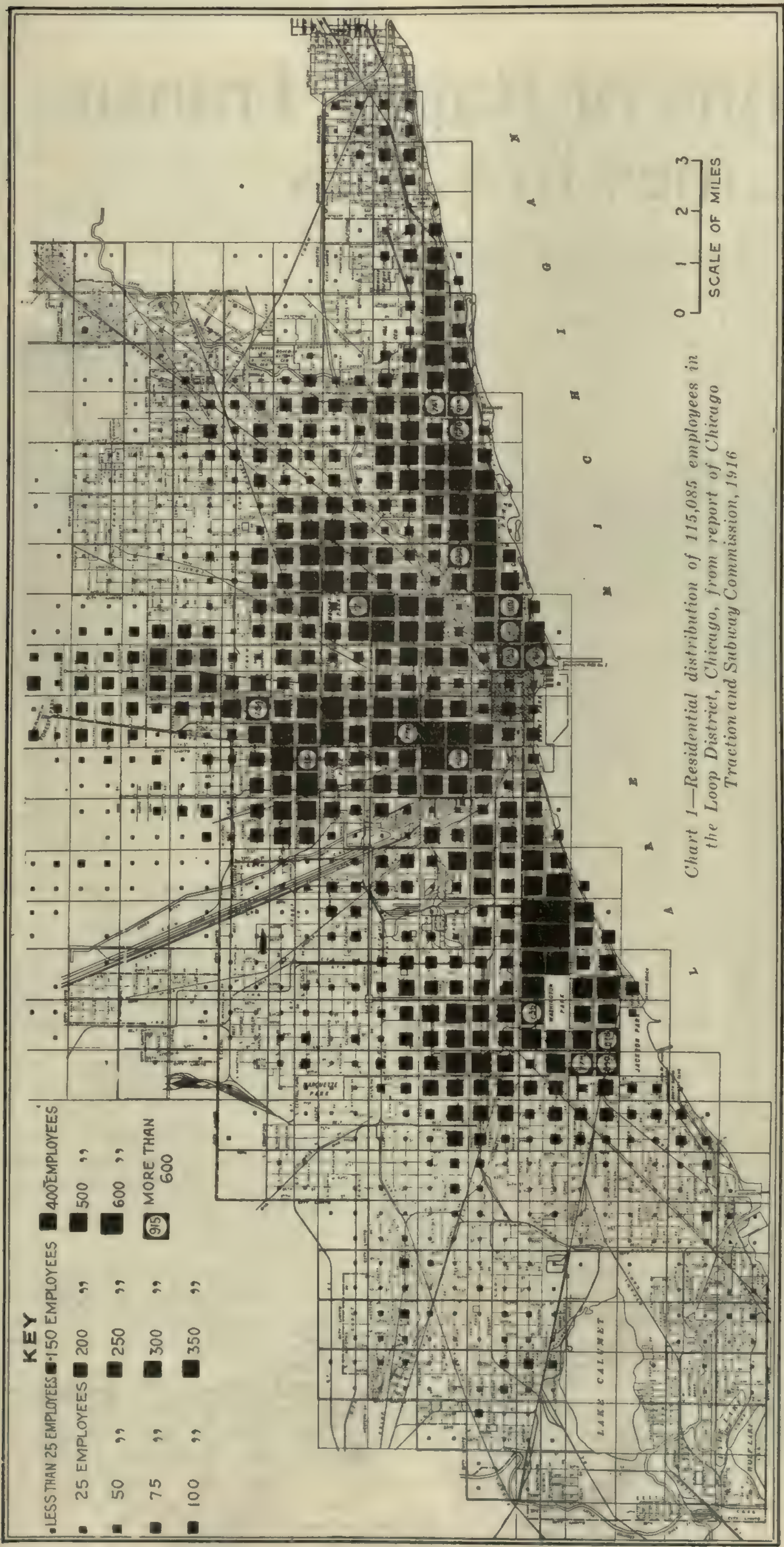


Chart 1—Residential distribution of 115,085 employees in the Loop District, Chicago, from report of Chicago Traction and Subway Commission, 1916

an even wider variety in the division of the passengers among the different classes of carriers, but still the rapid transit not in the majority. Here the motor bus (successor to the time-honored horsedrawn vehicle) assumes imposing proportions. The ratios of passengers carried may be taken as about 27 per cent on tram or surface cars, 33 per cent on motor buses and 40 per cent on rapid transit trains.

Greater London, with an area of almost 700 square miles and a population of about 7,250,000, carries one-third of its traveling public about the city in motor buses operated in crowded, heavily trafficked streets.

Greater New York at the other extreme, with a population of almost 6,000,000, distributed over about 327 square miles, or one-half London's area, carries 55 per cent of its city riders on rapid transit lines and not more than 2 per cent on buses.

Chicago, with a population of almost 3,000,000 and an area of about 200 square miles, carries 75 per cent of its travelers by surface cars, while Detroit and Cleveland, now at the 1,000,000 mark in population, are entirely dependent upon surface car transportation.

With such contradictory general facts before us we must apparently go to a more detailed analysis of conditions to draw any valuable lesson from past experience in the large cities of the world. In doing this the first question that presents itself is whether the study of existing systems will be of fundamental value in guiding us to a solution of modern transportation needs in a large city in accord with present-day thought.

Here appears to be the crux of the question. The existing transportation facilities in large cities are the result of private initiative; building for years along lines where greatest pecuniary profits were to be reaped. Only recently has this guiling motive been supplemented by effective public control, and this has often been directed to meet certain specific needs rather than a general solving of the whole problem.

We are today at a point where a broader view must be taken of city transportation planning in the interest of the traveling public's needs and convenience. The public must pay for the service directly or indirectly, but it must get what it pays for. The idea of the most profitable type of location of lines is therefore no longer absolutely controlling and we are face to face with the problem of supplying transportation to our large cities, as recognized a public necessity as water supply, paving and sewerage. The fact that an adequate circulatory system for a city's red-blooded working units is as necessary for civic growth and health as is a sound arterial system for the human body is becoming more generally recognized. In the solving of this problem city and company must co-operate to overcome the physical, financial and legal obstacles that will be met.

The time has come when a hearing can be obtained for an analysis and discussion of the complex elements of transportation from the viewpoint of the needs of the city as a whole. The purpose of this article is to point out the uses of subway and elevated lines with such a broad view of the situation in mind, but in doing so references to other forms of city transit are necessary to maintain a balance and completeness in the picture.

The real need for extensive transportation facilities in a large growing American city arises principally from the desirability, or often the necessity, for the individual workers[1] to

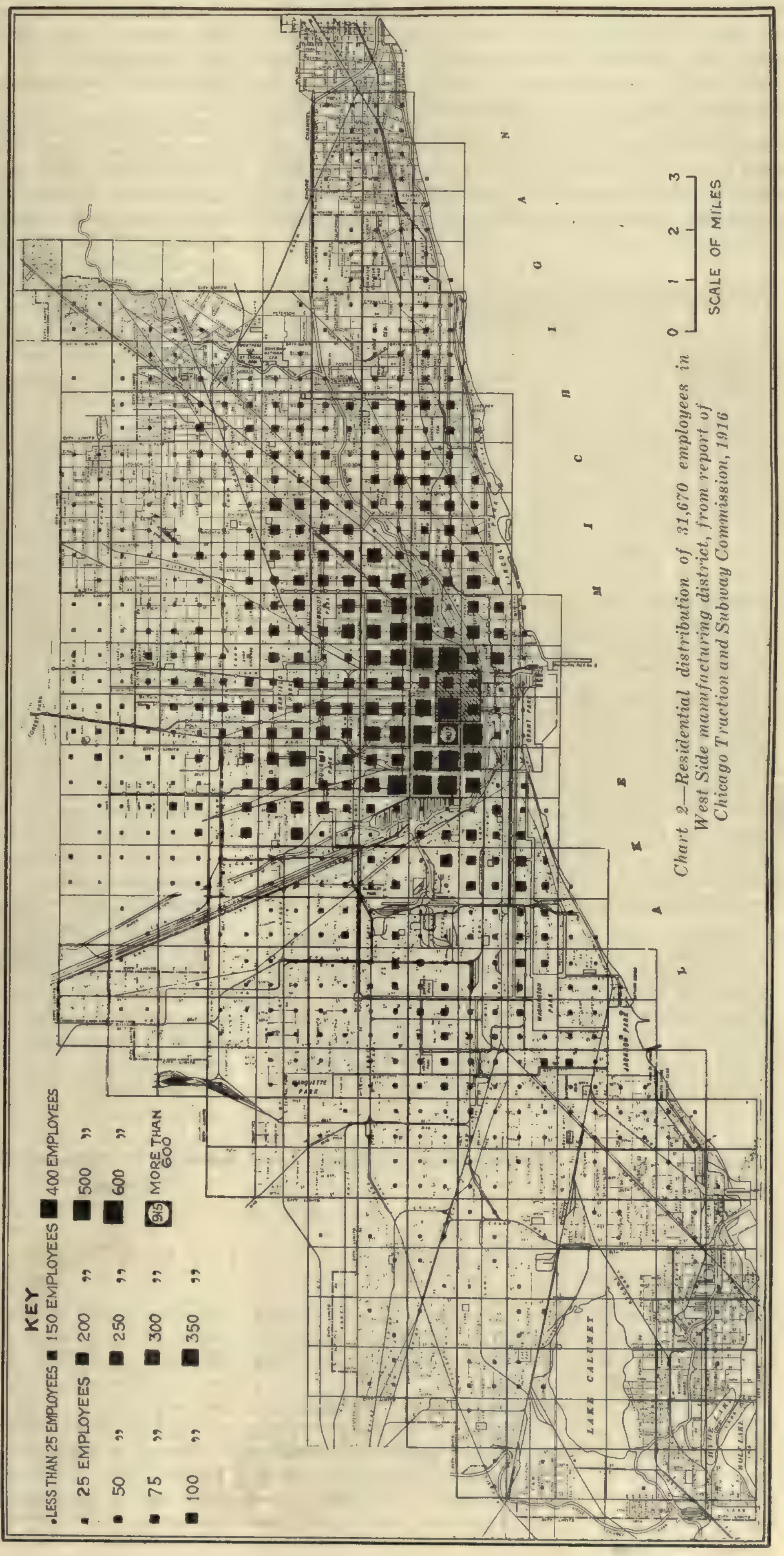


Chart 2—Residential distribution of 31,670 employees in West Side manufacturing district, from report of Chicago Traction and Subway Commission, 1916

live beyond walking distance from their place of employment. The hauling of these people to and from their work constitutes the great bulk of the rush-hour traffic, hence a careful study of their riding habits is a valuable index to their transportation needs.

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[1] The term workers is used in this article to denote any wage earner or person having regular employment or business and consequently regular habit of travel.

A canvass of the principal factories of the city of Cleveland showed that 52 per cent of their employees lived beyond the walking distance of 1 mile from their shops. Detroit showed 71.8 per cent, and a canvass in Chicago, locating the homes of 350,082 wage earners from all classes of shops, factories, retail stores and office buildings, showed 75.6 per cent living beyond 1 mile and therefore dependent upon transportation to earn their living.

TABLE I

Occupational Distribution of Workers in Chicago Loop District

Occupation		Tranportation Used		Per Cent
In office buildings	32,113	Elevated R.R.	64,847	56
Department and retail stores	32,755	Surface cars	43,344	38
Clothing manufacturers	10,045	Steam suburban.	3,921	3.4
Banks and general offices	26,622	Walkers	2,973	2.6
Printers and engravers.	3,304	Total	115,085	100
Miscellaneous	4,378			
Wholesale dry goods.	5,868			
Total	115,085			

An exhaustive detail study of the transportation habits of the people of a large city involves a great amount of work and the co-operation of many interests and has not often been undertaken. The most recent complete collection of data of this kind is contained in the report of the Chicago Traction and Subway Commission of 1916 and the figures there developed will here be used as illustrating the basis of the division of riders between surface and rapid transit lines and the causes influencing their choice of routes.

ANALYSIS OF CHICAGO TRANSPORTATION NEEDS

An analysis of the Chicago residential canvass, which covered all employment centers within the city area, showed a wide scattering of nearly all classes of workers over the many residential districts of the city. Thus it was possible to prove the almost universal need for transportation and also the great diversity of routes and combinations of car lines used by people in a single residence district in reaching employment centers, and vice versa the widely separated localities from which the factories drew their workers.

The American wage-earning family averages five persons, father, mother and three children, of whom three are usually workers. Unlike families in England or on the Continent, the children in America do not as a matter of course learn the trade of the parents, but each follows his own bent, with the result that they travel from their home center in many different directions seeking employment. It is the aggregation of many thousands of such families which creates the diversity in the transportation demands of our large cities.

The Chicago residential canvass when compared with a simultaneous traffic count on surface and rapid transit lines showed that the origin and destination of the daily trips of 50 per cent of the individuals composing the rush-hour crowds had been determined. As an indication of the probable proportion of these rush-hour travelers who require rapid transit, a charting by ¼-mile districts showed that 44.3 per cent made trips to and from work of more than 3 miles and 31.6 per cent of more than 4 miles. The rapid transit lines of the city carried 22 per cent of the total traffic against 78 per cent on the surface cars on the weekdays checked, while for the calendar year the ratio was 25 per cent to 75 per cent.

Adopting the generally accepted idea that more than 3 miles constitutes a legitimate rapid transit ride, the inference is that the elevated lines were inadequate or some other elements influenced the result beyond the mere question of distance. It was found that the principal element was "time," and its closely related factor "direct routing." By means of transfers from line to line the surface system offered routes particularly crosstown, which saved time over less direct although higher speed rapid transit lines.

To determine the time factor the Chicago Loop District was selected and 115,085 workers of all classes employed in this crowded city center were located as to residence, as shown on Chart 1, on which each black square indicates by its size the relative number of workers residing in that ¼-mile area who were employed in the Loop District. These for our purpose can be classified as shown in Table I.

Analyzed by distances from home to work, the division was as shown in Table II.

TABLE II

Classification of Chicago Loop Workers by Distance Traveled

	Total	0–1 Miles %	1–2 Miles %	2–3 Miles %	3–4 Miles %	4–5 Miles %	5–6 Miles %	6–7 Miles %	7–8 Miles %	8–11 Miles %	11–14 Miles %	Over 14 Miles %
	115,085	3.7	11.0	11.4	15.6	15.7	12.9	10.5	7.6	6.2	1.7	3.7
Accumulative total, per cent	......	3.7	14.7	26.1	41.7	57.4	70.3	80.8	88.4	94.6	96.3	100.

Deducting the walkers in the last tabulation, it is seen that 39.1 per cent rode 4 miles or less, which closely matches the surface car percentage shown above.

The analysis of this office and retail district canvass gave a good idea of the division of riding of the classes most easily attracted to rapid transit by reasons of ability to live in restricted residence districts and working short hours. A similar analysis of the immediately adjacent factory district west of the river (Chart 2), including 31,670 workers, showed 16.7 per cent walkers, while 53.6 per cent lived within the 3-mile limit and 69.8 per cent within 4 miles of their shops, 83.3 per cent in this factory district being dependent on transportation.

The difference in these two sections lay almost entirely in the character of the people employed. The average for the whole city was: Walkers (under 1 mile), 24.4 per cent; those living within 3 miles from work, 55.7 per cent; within 4 miles, 68.4 per cent; the per cent of workers daily using transportation being 75.6 per cent. When rapid transit routes are laid out, therefore, the character of the population to be served is an important element to be considered.

A special inquiry into time-saving covering 6,000 of the above workers in the Loop District (Chart 1) supplied the data for the curve shown on Chart 3. The individuals inquired of for this purpose were selected because they were as conveniently located for reaching either surface or rapid transit lines. They were also distributed over a wide area and at varying distances up to 16 miles from the Loop. This chart therefore gives a good idea of how people of this class divide on the question of time saving in a city like Chicago, other conditions being substantially equal.

TRANSFER FACILITIES

When the original Interborough Subway was laid out many loud criticisms were made of the local and express transfer stations, voicing the idea that on short trips people would not trouble to change cars. Today exchanging from local to express trains and back again for a saving of even a couple of minutes is so common as to have become almost a vice of the New Yorker.

On one surface car line in Detroit a traffic count showed that 85 per cent of the passengers either transferred to or from other lines, only 15 per cent of those carried starting and ending their journey on the line itself. At the City Hall in Detroit the Woodward Avenue line received or delivered 57,817 transfer passengers daily who utilized ninety-two different combinations of routes at this point. A similar condition exists at the Public Square in Cleveland, where 79,451 transfers were observed in twenty-four hours, more than 100 different combinations of lines being used.

The Chicago investigation showed clearly that the transfer privilege at more than 545 intersections of surface lines was a great factor in determining the routing of passengers; from 10,000 to even 25,000 transfers occurred daily at single intersections. Many groups of large numbers each were found who took the first leg of their journey on a nearby surface line and transferred to another surface car, running parallel to a rapid transit line, for a 4, 5 or 6-mile ride.

Careful study of complete twenty-four-hour checks of passengers on the surface and elevated lines of Chicago clearly demonstrated that these two large competitive systems serving a population of more than 2,500,000 distributed over 200 square miles of territory, due to their lack of co-ordination, did not function in such a way as to give the best service of which they were capable.

When the problem of enlarging the Chicago city transportation system as a whole was attacked by the commission it became still more apparent that additions to the existing systems on a basis of unified operation not only gave more capacity for a given expenditure but provided a greater variety of convenient routes to riders and would also be more economical to operate.

Transportation is a necessary function of a city's life as a whole. It is not confined to districts, classes of people or occupations. It is as democratic and cosmopolitan as the population of the city itself. Such being true, a division into separate lines serving only portions of the city is purely artificial, and the result of a system of development of these facilities by individuals largely influenced by hope of profit and with capital limited by the assurance of a return on their investment has been piecemeal construction.

When taken up from the viewpoint of the interests of the entire city's traveling population the proper arrangement to accomplish a complete solution is a single unified system the elements of which will each give the maximum of service at the least cost, both capital and operating. It is not within the scope of this article to discuss the many legal, financial and other obstacles to accomplish a general unification of all transit facilities. However, the function of subway and elevated lines is so dependent upon their relation to the other modes of transporting city passengers that whether they should properly be considered as competitive independent systems or should function as part of a harmonious whole seems to warrant the foregoing discussions.

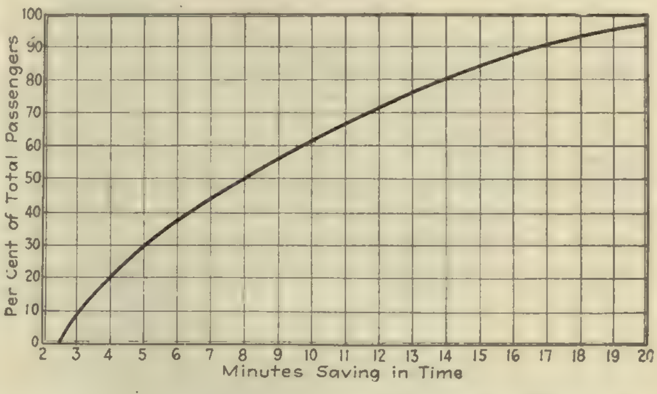


Chart 3—Percentage of total passengers using rapid transit for various savings in time when both surface and rapid transit lines are available

(From report of Chicago Traction and Subway Commission)

MOTOR BUS, SURFACE, ELEVATED AND SUBWAY LINES

In order to consider the relative value of these four kinds of service in a complete unified city system it is simpler to compare ratios of cost or performance freed from local conditions. Present cost of construction, operating expenses, etc., are so abnormal and are changing so frequently even on the same system that direct comparisons are misleading without a multitude of explanations. For our purpose the following general statistics are typical of good American practice on average large city systems:

Maximum Passenger-Carrying Capacity per hour.—One way, one track: Bus, 1; surface, 1.7; elevated, 6; subway, 7.

This means that large two-car units on surface lines will carry a little less than twice the bus line under similar street conditions. The elevated with eight-car trains will supply six times and a subway with ten-car trains seven times the bus line passenger capacity. This is on the basis of allowing for standees, large cars and maximum peak load conditions.

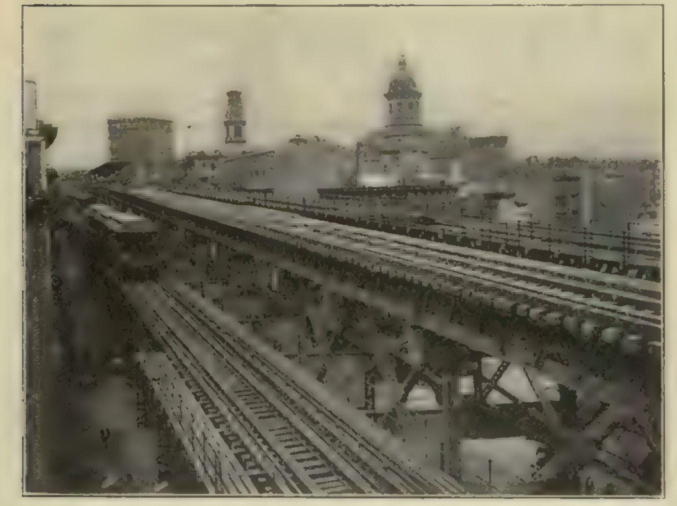
Speed in Miles per Hour.—Average city conditions (Fifth Avenue Coach Company, 8½ miles per hour): Bus, 1; surface, 1; elevated, 2; subway, 2. The surface cars and buses are about equal in average speed and the elevated and subway twice as fast.

From these two items it is plain that where large crowds are to be handled and the haul is long the subway and elevated are immensely superior, having seven times the capacity of a bus line and twice the speed. As the presence of large passenger crowds means usually street congestion, these types have the additional advantage therefore of not occupying street space.

Cost of Operation per Car-Mile.—(Fixed charges excluded.) Subway, 1; elevated, 1.2; surface, 1.8; bus, 2. Here the economy of train operation with infrequent stops and on an easily maintained unobstructed right of way places the subway at the top of the list.

Operating Cost per Passenger Carried, 1919 figures. —(Fixed charges excluded.) Subway, 1; elevated, 1.2; surface, 1.4; bus, 2.6. This proportion is taken from averages of the actual 1919 figures of American systems so far as they can be brought into direct comparison. In these figures there is of course reflected the length of haul, in which regard the rapid transit lines have the worst of the bargain as they carry their passengers probably twice as far as the surface and three or four times as far as the bus lines.

Capital per Mile of Line.—Bus, 1; surface, 2; elevated, 12; subway, 36. Here the bus line makes the best showing, with the surface line at double the cost and the subway three times that of the elevated.



The completion of the third track on the Ninth Avenue line added greatly to the carrying capacity.

SUBWAY, ELEVATED AND SURFACE LINES COMPARED

On the face of these figures the subway costs thirty-six times as much as the bus lines and has only seven times the passenger capacity. If, however, the two are compared by requiring the buses to move the subway load, seven lines of buses would be required and a total street width of 230 ft., or four times the width of Fifth Avenue at Forty-second Street. If this widening were charged against the bus system the cost would be fabulous. Similarly, if a subway were built to carry a load of 7,000 passengers per hour, one train every ten minutes would carry them and the fare would have to be ridiculously high to cover the enormous fixed charges. The fact is that such direct comparisons are futile and go to prove that each of these systems has a limited field of its own. Each type should be used for the service to which it is peculiarly adapted and if properly incorporated as part of a single system will reach its maximum effectiveness and efficiency.

In view of these comparisons, it is quite apparent that subways should be confined to the main arteries of the city system and so far as possible to the densely trafficked districts. As the elevated form of structure supplies the same passenger capacity and speed as the subway the logical plan in the interests of economy is to come to the surface with the subway and extend the service by elevated wherever the building and property damage is not too great. Much talk was indulged in a few years ago advocating the taking down of the elevated railroads in New York, but today with the express service on the third tracks no one could conceive of abolishing this system and replacing it with subways at three times the cost.

When people speak of subways they visualize the New York ten-car train system in rush hours and when they mention elevated lines they think of the old Ninth Avenue, New York, or the Chicago Union Loop lines with their unsightly appearance and noise.

It is a pity that this latter conception cannot be supplemented with more up-to-date possibilities. In a city like New York, with its multiplicity of traction companies, its narrow and infrequent north and south streets and its unprecedented volume of rush-hour traffic, four-track subways paralleling one another may be justified, but in other cities whose rapid transit history is still to be written quite another procedure is not only possible but necessary.

Subways as such have no inherent virtue. They are, as we have seen, three times as costly to build as elevated lines and eighteen times as costly as surface lines. Why then should we not take the surface line, which usually exists and which the subway will parallel, and leaving it on the surface of the street as a local service transfer vertically to the subway express service below.

CONSOLIDATION OF VARIOUS SYSTEMS DESIRABLE

By utilizing the surface lines as local and feeder lines and transferring long-haul passengers down to subway or up to elevated express trains a vast saving can be shown over the building of a competing rapid transit system. This latter, if competitive, must draw its patrons from the limited territory immediately adjacent to its own lines. This lack of transfer surface feeders is one of the causes of the beehive type of apartment housing in New York.

In a radial city like Chicago or Detroit the building of rapid transit lines to all outlying sections is financially impossible. The intermediate areas between trunk lines will be well served by surface lines with transfers to these rapid transit lines.

Such a single system, it can be shown, will give greater facilities than two competing systems and at a far lower cost per capita.

The consolidation of city systems has been frowned upon by some people because it creates a monopoly, but with proper public control this is just the very element necessary for success in giving all classes of people the vast multiplicity of services called for by the activities of a big city.

The dismemberment of some of the consolidated New York Traction groups is an object lesson pointing the way in the opposite direction. Subways and elevated lines are necessary parts of the traction system of a great city, but they should have combined with them surface and bus lines as feeders, all functioning as part of a single system.

The operating policies that attract patrons are discussed. Better freight service at higher than steam road rates makes wonderful opportunity

The Possibilities of Interurban Railroads

By Britton I. Budd

President Chicago, North Shore & Milwaukee Railroad, Chicago, Ill.

The North Shore all-steel car limited trains have won many new patrons

THE success of an interurban railroad is measured by the quality of the service it is in a position to give the public. To meet the competition of the steam railroad the interurban line must have many of the characteristics of the steam road and adopt many of its practices and methods. Men in charge of operation of interurban railroads must get away from the idea that they are operating a street car line. That idea has too long retarded their growth and development in many localities.

The traveling public in this generation demands speed. The cost of transportation to most people is a secondary consideration. They are willing to pay a reasonable price if they are given the service they demand. On the other hand if they are not given the service they will not patronize a road no matter how low its rates may be.

In order to give the service demanded the interurban railroad entering cities of considerable size must have suitable trackage rights and adequate terminal facilities. Most of the interurban railroads in the country today lack such facilities, and that is the greatest handicap in the way of their development. It is one of the problems which must be solved if the interurban railroad is to develop and increase its usefulness to the public.

This serious handicap of the interurban railroad is generally due to bad engineering in the early days of the electric line. In making that statement I mean no criticism of the early engineers. The bad engineering to which I refer is more often the result of the early engineers having been compelled to follow the line of least resistance and select the most inexpensive route than it is to their lack of foresight or poor judgment. But the fact remains that the trackage facilities of interurban railroads in most cities necessitate low rates of speed and thus throttle the possibilities for expansion.

The operating and engineering methods and practices of street railway companies are not applicable to an up-to-date interurban railroad. The operating methods of a well-conducted steam railroad are greatly superior to those of the average electric railroad. The latter have been developed from the experience gained in street railway operation and still partake of some of the characteristics of the horse-car days.

The character of the service demanded by the interurban railroad is very similar to that of the steam railroad and the same methods of operation must be adopted if the support and approval of the public are to be attained. On entering a city an interurban railroad should not give a local service. The route of least obstruction, where the highest speed can be maintained,

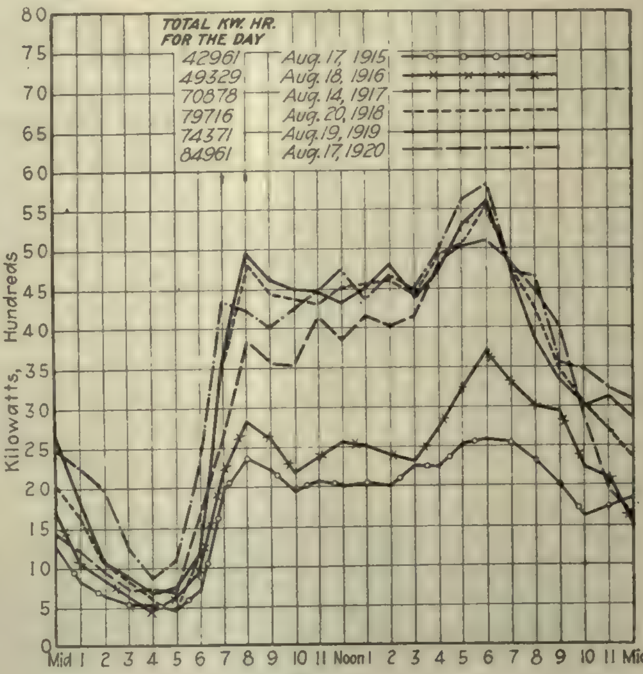
One of the automatic substations which have contributed vitally to the character of service

should be selected and stops should be reduced to a minimum.

To maintain the high rate of speed essential to the success of the interurban railroad today great attention should be given to tracks and roadbed. Short radius cross-overs, turn-outs, wyes and sidings should be avoided. They consume time, rack the equipment and make the passenger uncomfortable. The automobile has produced a change in the mind of the public with respect both to speed and comfort, and the electric railway must, as nearly as possible, measure up to the modern standard of comfort and speed.

The roadbed of an interurban railroad is of the utmost importance where high speed is required. It is the very foundation of the business. The roadbed should never be neglected. In building many of the electric lines not enough attention was given to the work of tiling and ditching. The result is defective track, making high speed impossible and contributing to the loss of patronage that necessarily follows.

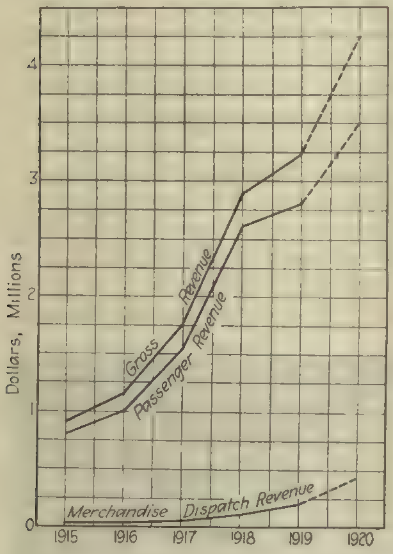
The public is more sensitive to track conditions than most operating officials realize. If the roadbed is not well maintained by constant tie and rail renewals, good ballasting and thorough drainage, its condition soon becomes a matter of comment and discussion among patrons. If the public forms an opinion that the track is not what it should be the company will find it extremely difficult to overcome that prejudice. It is extremely important that such an impression should not be formed, and the only safeguard against it is the proper maintenance of the roadbed.



The load curves indicate the growth as well as the character of the business of the road

Most interurban railroads spend money in advertising. While I am not opposed to newspaper advertising

All-steel car designed to give the speed that has been an attractive feature of the North Shore service and publicity of all kinds, I am convinced that the best form of advertising is giving the public real service. Glowing advertisements may, and I think they do, help to draw business, but unless a company actually "delivers the goods" it will not hold the business which its advertising may bring. Pleased patrons talking among their friends of the good service given by an interurban railroad are worth a great deal more to a company than paid advertisements. The public cannot be fooled by alluring pamphlets. They demand service, and when they are given that their good will and patronage will follow. An interurban railroad operating any considerable distance should make an effort to fit its service to meet the transportation needs of the people of that particular section. In order to obtain the business of traveling men it may require provision for carrying baggage. It is not infrequent that considerable business is lost to interurban railroads due to lack of this accommodation. This is true of theatrical folk as well as traveling men. Dining car service is also a requirement of business men and traveling men, for it economizes their time. If dining car business is attempted it should be the effort to furnish exceptional service and satisfactory meals. If this is not done, instead of attracting patronage it will have a detrimental effect. Only experienced chefs and waiters should be employed and the strictest attention should be given to the sanitary condition of car kitchens.



The merchandise dispatch has increasing importance in rapidly growing revenues

The kind of roadbed that makes possible the kind of service that sells

The electric railways of the country have suffered and still suffer from a great many circumstances over which they have no control. But they also have suffered from causes that are within their control. Certainly the industry has enough to meet in the way of real problems without having to meet needless criticism. No matter how poor a property may be, how inadequate its facilities or how much it may be hampered for lack of money, it still can be operated efficiently, at least as efficiently as the circumstances will permit, and give reliable service.

Transportation of merchandise can be conducted successfully on an interurban railroad at rates higher than freight rates on steam railroads, provided the service is better than that on the steam road. It is not necessary for the interurban road to have a pickup and delivery service in order to obtain higher rates from shippers if the quality of the service warrants the higher charges. There are so many objections to a railroad carrying on a pick-up and delivery business that it is not necessary to go into the subject in detail. In the handling of merchandise the interurban railroad must adopt the most up-to-date methods of soliciting, billing, notifying the shipper and adjusting claims

The cars have a comfortable seating arrangement and an inviting interior

An excellent dining car service has attracted many business men who might otherwise patronize steam lines

TABLE I

Merchandise Dispatch Revenue, Chicago, North Shore & Milwaukee Railroad

	1915	1916	1917	1918	1919	1920
Jan.	$521	$853	$315	$7,502	$9,303	$26,354
Feb.	495	1,159	244	13,028	6,504	32,547
March.	590	652	2,381	7,132	8,515	33,341
April.	390	1.186	2,220	8,259	12,340	40,179
May.	1,734	2,720	2,732	7,700	18,658	36,157
June	1,949	2,986	3,298*	8,405	16,433	39,770
July.	1,906	3,684	4,255	9,520	17,008	39,329
Aug	1,738	2,511	5,689	10,483	19,063	......
Sept.	1,706	4,415	3,965	10,562	20,009	......
Oct	4,640	3,827	8,821	11,455	26,863	......
Nov	9,221	3,572	8,616	12,127	22,153	......
Dec.	1,896	1,555	6,666	10,278	22,382	......
	$26,786	$29,120	$49,202	$116,451	$199,231	$247,677

* Operation of merchandise shipments was begun in June, 1917, between Milwaukee and North Chicago. This service was extended to Evanston in December, 1918, and to Montrose Boulevard, Chicago, in November, 1919.

promptly. My experience is that the shipper does not object to paying a higher rate than is charged by a steam railroad, provided his goods are handled in a more expeditious way than the steam road can handle them, and there is no doubt in my mind that the interurban can do that if it is efficiently operated. No road can expect to charge higher rates and give a "Toonerville Trolley" service. It is such methods that have discredited the electric railways and made some of them a joke in the mind of the shipper. What has been said of passenger service applies with equal force to merchandise. The shipper demands service and he is willing to pay for it. The electric railway is reliable 365 days in the year and if it maintains a high standard of efficiency it will get business.

There are wonderful possibilities for the interurban railroads to develop a merchandise service. It is quite possible for them to interchange with other electric lines, even when there is no physical connection, although that necessarily means some delay and adds to the expense. Where physical connection can be made and a through service operated it is of great advantage to the companies as well as to the communities they serve. With the present shortage of steam railroad equipment, terminal facilities, etc., a great opportunity is offered the electric lines to demonstrate what they can do.

It is well known that the motor truck has its limitations. In a northern climate there are weeks and sometimes months when it cannot operate. Even under the most favorable circumstances for the motor truck, the electric railway can transport merchandise cheaper when it has to be carried any considerable distance. The motor truck is a good auxiliary to the electric railway and I see no objection to the electric railways maintaining trucks of their own to transport merchandise to receiving stations where the volume of business justifies it.

The problem of maintaining highways for motor trucks, with loads of from 1 ton to 25 tons, can be met in part by the electric railways, and the truck manufacturers and municipal, county and state highway officers are coming to a realization of this fact. Wherever possible, the electric railway should feature the slogan, "Use the Electric and Save the Highway."

Tractors with trailers have made possible a downtown station in the merchandise dispatch business

It is a mistake for the interurban railroad in large communities to centralize its merchandise business too much. Terminal property requires a large amount of capital and when the business is centralized it brings congestion in the trucking, a condition common on the steam roads where it is not unusual for a truck to waste three or four hours trying to make a delivery. The electric lines should be in a position to offer the shipper as an inducement the assurance that his truck or team can go to a convenient receiving station, unload and get away in a few minutes. That is one of the strongest talking points in getting business, and if centralization is going to destroy that feature I do not believe it would be wise. A better plan, I believe, is to locate at various points receiving stations, consisting of a platform, a driveway for trucks and a small office, where shipments may be accumulated and then transported by truck to a point to be loaded on cars. This is being done in Chicago and nearly 200 tons a

TABLE II

Passenger Revenue, Chicago, North Shore & Milwaukee Railroad

	1915	1916	1917	1918	1919	1920
Jan.	$52,296	$58,842	$81,654	$100,218	$206,022	$205,085
Feb.	48,391	58,000	72,106	111,892	182,325	216,218
March.	57,106	64,077	81,872	139,414	197,847	234,297
April.	64,296	74,041	93,016	136,919	186,381	242,764
May.	71,702	83,705	111,287	181,370	218,889	291,704
June.	66,936	88,655	139,858	248,535	237,044	276,542
July.	91,367	127,030	185,471	326,906	269,983	382,491
Aug.	88,947	111,552	193,786	352,474	314,102	......
Sept.	76,858	107,630	183,139	284,325	281,549	......
Oct.	70,293	91,229	137,073	245,649	244,329	......
Nov.	63,259	85,585	135,815	251,342	241,746	......
Dec.	59,701	83,247	127,308	222,484	229,768	......
	$812,152	$1,033,593	$1,542,385	$1,601,528	$2,809,985	$1,849,101

In 1915 passenger rates were on a 5-cent zone basis, length of zone being approximately 2½ miles. In February, 1917, fares were changed to a basis of 2 cents a mile. In October, 1918, interstate and Wisconsin intrastate fares were increased to 2½ cents a mile, Illinois intrastate rates remained at 2 cents. Fares were increased to 2.7 cents a mile on interstate and Wisconsin intrastate business on Sept. 1, 1920.

day are accumulated at one of these stations.

The rehandling of shipments, of course, should be reduced to a minimum. As to how far a container method will solve this problem I am unprepared to express an opinion. If a majority of shippers shipped from 2 to 5 tons in a container, I can readily see how it could be handled with economy. This, however, is not the case in most instances, so that a container would be only partially filled, or, it would contain several shipments which would require rehandling.

TABLE IV

Passenger Car-Miles Operated, Chicago, North Shore & Milwaukee Railroad

	1915	1916	1917	1918	1919	1920
Jan.	187,397	201,855	273,213	313,948	473,644	510,459
Feb.	166,861	189,395	236,565	325,515	429,620	474.978
March.	187,322	205,720	269.339	402,953	476,672	535,054
April.	208,352	218,681	306,000	421,763	448,004	532,131
May.	237,981	261,277	342,896	410.145	487,806	593,620
June.	241,881	264,598	339,216	460,191	492,408	566,002
July.	264,220	335,061	455,374	556,795	533.050	646.704
Aug.	265,944	321,984	466.857	542,451	572,857	......
Sept.	256,421	314,661	459,187	513,005	559,081	......
Oct.	245,483	295,963	443,162	494,366	563,121	......
Nov.	236,120	286,812	418,207	501,164	563,903	......
Dec.	225,162	282,665	400,182	499,824	514,045	......
	2,721,144	3,178,672	4,410,198	5,442,120	6,114,211	3,858,948

The North Shore Line, operating between Chicago and Milwaukee, has developed in one and one-half years a fast merchandise express business which now exceeds 10,000 tons per month, with a gross revenue of $50,000 per month. The type of equipment used is shown in an accompanying engraving, together with pictures of one of a fleet of White tractors and trailers used in moving shipments from receiving stations to terminals.

The remarkable growth of the business of the Chicago, North Shore & Milwaukee, as shown in the accompanying tables, forms an interesting commentary on the results which have accrued from operation of the road on the policies as outlined in the foregoing. With the problem at hand that of building up the property, the service given on the North Shore Line has been maintained in the lead of traffic, the effort then having been made to bring the business up to the service. The manner in which the riding has followed the improvements in service has been truly a revelation, it being sometimes difficult to analyze the source of all the business. Since 1915 the number of passengers carried has doubled, the number of passenger car-miles operated has been increased nearly two and one-half times and the revenue from passenger service quadrupled.

TABLE III

Gross Revenue, Chicago, North Shore & Milwaukee Railroad

1915	$911,670
1916	1,157,191
1917	1,751,373
1918	2,899,975
1919	3,237,921
1920	4,250,000*

* Estimated on basis of eight months actual.

The gross revenue of the property at the present time includes about $600,000 a year miscellaneous revenue in addition to passenger and freight, and this gross revenue has grown in five years from less than $1,000,000 a year to $3,230,000 in 1919, and beginning with September of 1920 the gross revenue of the road is at the rate of $5,000,000 a year.

A very interesting thing about this statistical picture of the North Shore road is that, from a beginning of practically nothing in 1915, the total merchandise despatch business of the property has been developed until at the present time it is running about $50,000 per month and constantly growing. In fact, the amount of this business available seems at the present time to be limited only by the company's ability to handle it. While it is overshadowed by the passenger business at present, it should be noted that no particular effort along this line was begun until 1918. This class of business now, however, is showing a growth which promises to give it an increasingly important part in the total earnings statement. The great bulk of this business is made up of less than carload shipments of merchandise that come under the first, second and third class of commodities. The above table of figures on merchandise dispatch revenue includes the l.c.l. business only. No particular solicitation of the lower rate materials or carload shipments is made at the present time, for the entire resources of the property are kept more than busy on the higher rate merchandise l.c.l. shipments. The rates for these shipments on the North Shore road average 30 per cent higher than the similar rates on the competing steam lines. In view of this rate comparison, the fact that the electric line is offered more business than it can handle would seem to demonstrate that shippers are willing to pay a higher rate for a superior service. Plans are being formulated for securing more equipment and to increase the company's facilities so that it will be able to handle the growing volume of this profitable business.

TABLE V

Number of Passengers Carried, Chicago, North Shore & Milwaukee Railroad

	1915	1916	1917	1918	1919	1920
Jan.	485,680	539,553	626,244	688,717	1,015,278	963,734
Feb.	455,053	515,874	555,664	721,648	887,197	993,768
March.	573,802	556,204	571,264	827,919	970,405	1,109,603
April.	548,475	580.250	643,825	783,517	942,078	1,066,838
May.	603,211	642,743	795,007	955,129	1,067,230	1,168,124
June.	571,151	641,649	918,133	1,129,696	1,092,289	1,101,538
July.	649,803	742,161	1,002,546	1,239,591	1,140,590	1,267,301
Aug.	642,593	701,463	1,044,615	1,305,555	1,146,834	....
Sept.	581,717	634,722	898,194	1,098,741	1,027,972	....
Oct.	604,694	653.901	816,230	920,109	1,048,824	....
Nov.	551,001	620,681	798,068	1,041,263	1.036.827	....
Dec.	545,338	630,468	767,178	978,938	1.050.910	....
	6,812,518	7,459,669	9,436.968	11,690,823	12,426,434	7,670,906

Safety cars reduce injuries to passengers, they provide safer, better paid and more interesting work for the employees, and they are popular with the public

Results of Safety Car Operation

By J. C. Thirlwall

Railway and Traction Engineering Department General Electric Company

The safety cars on this street in Brooklyn do a good business

THERE are in service today more than 3,000 safety cars, one-man operated; there are on order and in the course of construction about 900 more, and the writer believes this is only a good start. Their value to the industry is only beginning to be appreciated, and eventually, we believe, there can be and will be some 18,000 to 20,000 in service in this country and Canada.

As nearly as the benefits already accruing from existing installations can be approximated it may be said with a fair degree of certainty that the 3,000 cars now are increasing the net income of the roads which operate them more than $12,000,000 a year; that they have materially improved the public relations of the great majority of the roads using them, and they have provided more comfortable, more interesting and better paid work for more than 5,000 platform men. Against this splendid showing there are practically no offsetting disadvantages. Some few roads have criticised the maintenance, some have felt that changes in the doors or seating arrangement could be made to advantage, some think the ends of the cars must be strengthened against collision. But no general criticism of the design or equipment has been made, and the volume of repeat orders coming in from all sections of the country is the best testimony of the general satisfaction which the standard car has given.

The progress of the safety car idea has been remarkable. Starting late in the fall of 1916, or just four years ago, the Stone & Webster management placed twelve or fifteen cars in service at Fort Worth, Bellingham and Everett. Within six months it was convinced that it had discovered a big new principle of operation. A number of car and equipment engineers agreed and proceeded to advertise the idea. But by the end of 1917 there were less than 100 safety cars in operation, the installations were small and the whole matter was still in the experimental stage. However, it was during this year that the Stone & Webster operators standardized on a car which was slightly different from Mr. Birney's original design and which with only slight modifications in equipment and dimensions has since been accepted as a standard by the industry as a whole. By the end of 1918 there were between 500 and 600 of these cars in service, and their successful operation in cities of considerable size, such as Seattle, Portland, Houston, Dallas and Kansas City, had given an immense impetus to their general use. By the end of 1919 there were approximately 150 cities in which the safety cars were running and about 1,600 cars were in service.

Today the number of cars in service has nearly doubled, and the number of cities in which they are used is well over 200. When existing orders are completed, within a few months, approximately 250 cities will be using 4,000 of these cars.

The writer has had the good fortune to have been able to observe at first hand the development of safety car operation in the majority of the larger installations, and his impressions of results are based on his personal observations and on conversations with an unusually large number of operating officials, public service commissioners and engineers, city officials and car riders. He has, as a result of such talks and experience, been absolutely convinced that the light-weight, one-man operated safety car is the best vehicle yet developed with which to meet the average and normal passenger transportation conditions in every city; that it can be operated more economically per passenger handled than any other type of car; that with it a better and more generally satisfactory service can be offered to the public for any given expenditure than with any other type; that it is extremely popular with the riding public, not only because of the improved service that has usually accompanied its use but because of its design and riding qualities, and that its general adoption and wider use hold out better prospects of financial rehabilitation to the average road than does any other physical change that can be made in the operation of the electric railways.

TABLE I

List of Thirty-eight Companies Which Have Operated Cars Prior to June, 1920

Name of Company Location	No. of Safety Cars Owned	Number Operated Average	Number Operated Maximum
Brooklyn Rapid Transit, Brooklyn, N. Y	206	168	192
Kansas City Railways, Kansas City, Mo	95	69	75
Third Avenue Railway, New York City	90*	64*	80*
The Connecticut Company, Bridgeport, New Haven, Hartford, Conn	76	65	67
Seattle Municipal Street Railway, Seattle, Wash	65	28	40
Tacoma Railway & Power Company, Tacoma, Wash	62	44	58
Trenton & Mercer County Traction Corporation, Trenton, N. J.	60	45	55
Terre Haute Traction & Light Company, Terre Haute, Ind	56	48	52
Northern Texas Traction Company, Fort Worth, Tex	50	30	50
Tampa Electric Company, Tampa, Fla	30	31	36
Colorado Springs & Interurban Railway, Colorado Springs, Col.	35	11	29
Illinois Traction System, Quincy and Decatur, Illinois	34	31	34
Pennsylvania-Ohio Electric Company, Newcastle and Sharon, Pa.	32	21	27
Houston Electric Company, Houston, Tex	31	27	31
Eastern Texas Electric Company, Beaumont, Tex	30	12	26
Birmingham Railway, Light & Power Company, Birmingham, Ala	25	11	20
Philadelphia Rapid Transit, Philadelphia, Pa	25	16	22
Portland Railway, Light & Power Company, Portland, Ore	25	20	25
Puget Sound Power & Light Company, Bellingham, Wash	24	16	20
Virginia Railway & Power Company, Petersburg, Va	22	17	22
El Paso Electric Railway, El Paso, Tex	20	18	20
Cumberland County Power & Light Company, Portland, Maine	15	12	14
Bangor Railway & Electric Company, Bangor, Maine	15	10	12
Saginaw-Bay City Railway Company, Saginaw, Mich	14	11	13
Texas Electric Railway, Waco, Tex	14	13	14
Dallas Railway, Dallas, Tex	12	8	11
Springfield Traction Company, Springfield, Mo	12	12	12
Austin Street Railway, Austin, Tex	10	9	10
Lincoln Traction Company, Lincoln, Neb	10	9	10
Louisville & Southern Indiana Traction Company, New Albany, Ind	10	10	10
Nashville Railway & Light Company, Nashville, Tenn	10	10	10
Chicago, South Bend & Northern Indiana Traction Company, South Bend, Ind	10	9	10
Columbus Railroad, Columbus, Ga	8	6	8
Hot Springs Street Railway, Hot Springs, Ark	7	7	7
Oklahoma Union Railway, Tulsa, Okla	6	5	5
	1,255	923	1,127

* The one-man cars of the Third Avenue Railway are not the standard Birney type of safety cars. They are, however, light-weight cars, with safety features, and are, therefore, included. All other cars listed above are of the standard type.

But to confirm these general impressions and to secure accurate and up-to-date data on results actually obtained, particularly in regard to the effect on net income resulting from the use of these cars, a questionnaire was addressed to some forty-odd companies, in every section of the United States, these companies being the ones which were known to have been operating safety cars for one year or longer, prior to June, 1920. Thirty-eight companies, owning more than 1.200 cars, answered, and the summary of their replies and the data submitted form the basis of this article. The thanks of the writer and of the ELECTRIC RAILWAY JOURNAL is extended to the companies named in Table I, which were kind enough to report the questions submitted.

A good indication of the feeling of the operators of the above properties is that at the time the above list was compiled nineteen of the companies had orders in for approximately 350 additional safety cars and at least five others were prevented from ordering more only by difficulties in financing the purchase.

As stated previously, all of these companies had been operating safety cars for periods of from one to three years, a long enough period to enable them to judge with reasonable certainty the capabilities and effectiveness of the car and the results of the service rendered and to ascertain the operating cost as compared with other types. Unfortunately, comparatively few companies have thought it necessary to segregate their cost accounts as between the safety cars and their other equipment.

COST OF SAFETY CAR OPERATION

However, nine companies, operating 307 cars, submitted complete figures segregated into the five chief operating accounts and comparing the cost per car-mile of the safety car and of their two-man cars, and four other companies, operating 227 cars, gave comparative figures on certain items, such as power and maintenance. They all agree remarkably closely in the proportionate saving of the safety car as compared with their heavier two-man type, although the total costs of the various roads vary widely due to differences in wage scales, cost of power, schedule speeds, etc.

For instance, one road on the Pacific Coast reports the total cost of operation for its two-man cars as 44 cents per car-mile and for its safeties as 24 cents per car-mile, a reduction of 45 per cent. The records of a road in a smaller city of the Middle West show the same relative figures to be 20.2 cents and 11.5 cents respectively. This corresponds to a reduction in operating expenses of 43 per cent.

The averages of all the figures submitted are as given in Table II.

TABLE II

Operating Costs in Cents per Car-Mile

	Safety Cars	Two-Man Cars	Saving Per Cent
Maintenance of way and structures	1.6	3.3	52
Maintenance of equipment	1.7	3.6	53
Power	1.9	3.8	50
Transportation	8.4	13.9	40
General	2.4	3.2	25
Total operating cost	16.0	27.8	42.5

The percentage of reduction in the individual items and in the total cost per car-mile agrees closely with other data previously obtained by the writer. The variations between records of the various roads are slight, and the records are based on a sufficient number of cars, operating under widely varying conditions, to be representative. Undoubtedly, the averages, as shown in Table II, can be duplicated by any road and, for equal car mileage, any urban electric railway can secure a reduction of approximately 40 per cent in its operating cost or it can operate 80 per cent more mileage with safety cars than with heavy two-man equipment with no increase in operating expense. It therefore follows that increases in service, or mileage, amounting to 30 per cent, 40 per cent or 50 per cent can be made and still save materially in the operating accounts.

Although in operation only a short time in Los Angeles, safeties are as popular there as elsewhere

The great majority of installations have been upon the latter basis. Of the thirty-eight companies reporting, only ten made car-for-car replacement. They are in general the smaller cities and own only 124 cars, or less than 10 per cent of the total. Three companies owing 137 cars report 100 per cent increase in service, or two safety cars operated for every two-man car displaced. The remaining twenty-five companies, owning approximately 1,000 safety cars, all show increases in service ranging from 20 per cent to 80 per cent, and averaging 50 per cent.

The effect on riding or on the gross passenger receipts varies quite widely. Some companies report receipts advanced in full proportion to the increased mileage. One company with 100 per cent more service found only 20 per cent more riding. Others report increases, but say that other factors, such as change of fares, fluctuations in population, etc., make it impossible to tell what effect the improved service had on the volume of traffic. Nineteen companies give figures which, averaged, show that with a 52 per cent increase in miles operated they secured a 37 per cent increase in revenue passengers carried. This agrees fairly well with the data presented by H. G. Bradlee at the November, 1918, convention of the American Electric Railway Association.

The companies reporting used about 70 per cent of the cars they owned in all-day service, and in rush-hour service an additional 20 per cent. The average receipts per car-mile were 28.5 cents; the average speed 8.4 m.p.h. The average operating costs were 16 cents per car-mile for the safety cars and 27.8 cents for the two-man, heavier types. The average effect on net income, therefore, for the roads using the safety car on an improved service basis is shown by Table III, based on a 100-car installation.

These figures represent almost exactly the average results reported by the companies which gave increased service. After replacing two old cars with three safety cars, and increasing mileage, which is the measure of service, 52 per cent, they still save one-eighth of their former operating cost and raise their gross passenger revenue 37 per cent. The net result is an increase in net income of more than $3,700 for each safety car purchased, or more than 50 per cent per annum on their present selling price.

SAVINGS FOR A CAR-TO-CAR REPLACEMENT

It is harder to calculate what the roads are saving that are able to make a car-for-car replacement. The properties which have kept records are all in fairly large cities, and all report an improved service. Of course, even in the larger cities there are some lines where traffic is so light that the safety car can be readily applied on existing headways and schedule speeds, and on such properties, using the relative costs of operation

Safety car at loading platform, Kansas City

They pass without trouble under elevated structures

of the foregoing tabulation, the results of car-for-car replacement would be as shown in Table IV.

In the smaller cities, where car-for-car replacement would be the normal rather than the exceptional procedure, wage costs are usually below that of the larger communities and, in most cases, single-truck cars of moderate weight are used. Under these circumstances, the savings in power, maintenance and platform costs are less, but if we may take the figures from Terre Haute as typical, where the average cost per car-mile for the safety cars is 11.5 cents and for the two-man cars, most of which were single truck, is 20.2 cents, the saving per car purchased on a car-for-car replacement basis, and making the same mileage as in the table above, would be slightly more than $3,200 per car annually. Of course, in the case of Terre Haute, this plan was not followed. A liberal increase in numbers of cars and in the schedule speed was made, and it is gratifying to note that the increased traffic which resulted has paid a far more liberal return on its investment in new equipment than could have been secured by straight replacement. The company's records show an increase in net income of more than $4,000 per car and good results in the improvement of public relations.

TABLE III

Comparative Costs and Receipts on 2 to 3 Basis

	Two-Man Cars	Safety Cars
Total cars required	67	100
Cars operated sixteen hours daily	46	70
Cars operated four hours, except Sundays	13	20
Car-miles per annum	2,393,000	3,644,000
Increase in service		52 per cent
Receipts per annum, at 31.7 cents per car-mile	$758,130	....
Receipts per annum, at 28.5 cents per car-mile		$1,038,540
Increase		37 per cent
Annual operating cost at 27.8 cents per car-mile	$665,254	....
Annual operating cost at 16.0 cents per car-mile		$583,040
Decrease		12.5 per cent
Operating ratio	87.5 per cent	56 per cent
Net income	$82,876	$455,500
Increased net income		$372,624
Increase per car purchased		$3,726

TABLE IV

Estimated Saving on Car-for-Car Replacement

	Two-Man Cars	Safety Cars
Total cars required	100	100
Cars operated sixteen hours daily	70	70
Cars operated four hours daily, except Sunday	20	20
Car-miles per annum	3,644,000	3,644,000
Annual cost of operation at 27.8 cents	$1,013,030	
Annual cost of operation at 16 cents		$583,040
Annual saving per car purchased		$4,300

Trenton, N. J., has sixty of these cars in daily operation

A point of great interest to the public and to the operators alike is the relative safety of operation of two-man and of one-man cars. W. H. Burke has treated this subject so exhaustively in a recent issue of the ELECTRIC RAILWAY JOURNAL that it is unnecessary to go into any great detail. He demonstrated conclusively that the safety car was well named, that it actually does have fewer accidents than the older cars handled by two men and that personal injuries both of the public and employees are reduced by its use. But some figures along a similar line, derived from the reports of a greater number of companies, may be of interest. The questionnaire sent out in the inquiry on which the present article is based called for the relative number of accidents involving personal injuries, both in terms of car-miles operated and of passengers carried. Fourteen companies operating 560 safety cars replied with definite figures. Only one showed any increase in such accidents, one reports no change and twelve report a material reduction. The average of the replies on this subject can be grouped as shown in the above table.

ACCIDENTS INVOLVING PERSONAL INJURY

Total accidents per 1,000 car-miles		Passengers Carried per Injury	
Safety Cars	Two-man Cars	Safety Cars	Two-man Cars
0.39	0.59	123,000	49,000

These figures are even more favorable than Mr. Burke's, his data being based on all accidents, whether involving personal injury or not. In addition to the fourteen roads which gave statistics on this subject, seventeen others expressed opinion, and only two of these claimed any increase in personal injuries. The balance report "personal injuries reduced," "step accidents less," etc., but a number say in effect "personal injuries less, but property damage more." In fact, after reading all the replies, the conviction is unescapable that collisions with other vehicles, especially automobiles, are more frequent with safety cars than with heavier types, and that the damage done to the safety car is greater. This condition may and probably will be minimized by changes in the platforms and brake rigging of the cars during the past year. The car builders have made a considerable improvement in these two details, largely as a result of complaints of collision damage.

WHAT ARE THE LIMITING FEATURES

The replies to a question as to what are the factors limiting the use of one-man cars were nearly all alike in the trend of thought. There seems to be a general conclusion that there are no limiting conditions in cities up to 150,000 unless it be lines crossing a great number of steam road crossings, or a line carrying an unusually large factory load. For all cities, the almost universal answer was that the only limiting factor was track saturation or traffic density, and various operators differ in their ideas as to where this density forces the use of larger two-man cars. One or two believe that lines having normal headways of less than four minutes are unsuitable for the safety car. But a manager in one of the very biggest cities, who has had a wide experience in operating safety cars, says that, on lines with loops at both ends, he "sees no reason why they could not be operated on a thirty-second headway" and that on lines where the car operator has to change ends he is now operating on two-minute headways with satisfactory results. Perhaps a consensus of opinion would be that where, on two to three minute headways, the average maximum load on the safety car exceeds fifty passengers a larger car can be used to greater advantage.

CONCLUSIONS DERIVED FROM STUDY

To the writer all these facts make the conclusion inevitable that the safety car has been such a tremendous success that no urban electric railway in North America can afford to neglect its possibilities; that its use will be very rapidly extended until the bulk of the all-day runs, or basic schedules, in every city will be handled with these cars. Summarizing all of the foregoing data, which only confirm observations and predictions made by the writer for the last three years, we can confidently say that the safety car will, on the average, produce sufficiently more net income to pay for itself in less than two years; that its effect on the finances of a company becomes more pronounced as wages and fuel costs increase, and that no other change in the physical equipment of any road can possibly be made that will so favorably or so extensively affect the operating ratio of the entire property. To many railways its use to the maximum extent will spell all the difference between prosperity and bankruptcy. To many others it will give the ability to pay a liberal return to the stockholders and enhance the value of all their securities. For thousands of platform men it will provide safer, better paid and more interesting work. And to millions of city dwellers, it will offer a more comfortable, a more frequent and more satisfactory service.

And by all of these groups there will be voiced the sentiment, tersely expressed by a good friend of the writer's in Texas, one of the pioneers in the safety car movement, "It is good enough for us!"

Cross-seat safety car and longitudinal-seat two-man car at Williamsburg Bridge Plaza, Brooklyn

Close relation of efficient schedules to economical operation. The eight-hour-day problem as worked out on the Boston Elevated Railway

The Scientific Arrangement of Schedules

By Edward Dana

General Manager Boston Elevated Railway

Three-car trains used on Reservoir-Beacon Street subway route, Boston. During rush hours these trains operate on a four-minute headway on this route

THE public usually measures street railway service by the trip. The study of traffic has to do with the number of trips operated and their arrangement through the various hours of the day according to the time they start. The science of schedule construction has to do with the arrangement of these same trips, which the traffic survey has definitely established into hours of labor for the men engaged in platform service.

Many people fail to appreciate the complex nature of this whole problem and the fact that, while certain general principles apply, almost every group of trips which has to be arranged as a schedule offers its own particular problem. In consequence, it is neither accurate nor fair to compare schedules in different localities without a complete knowledge of all the factors.

The relation of proper schedules to economical and efficient operation has always been an important matter. The increased cost of labor, with the advance in the price of coal, however, today makes every car-mile operated play an important and vital part in the situation, especially as it applies to fares. The aim of the company should be to draft a schedule scientifically arranged to provide just the proper amount of service to meet the traffic requirements over each route and over each portion of that route. Any more service is wasteful and affects the cost of operation. Any less service is likewise wasteful, by reason of its inadequacy and consequent irregularity, overcrowding or delay, resulting in loss of business and additional expense.

The task of arranging such an ideal schedule for week-day, Saturday, Sunday and holiday time-tables, as well as to meet the varying traffic fluctuations during the seasons by placing in operation short line service, varying the headway or adding trailers, is one of the most important elements today in operating any street railway system.

The second phase of the task is to arrange the work of platform men so as to provide for their working as closely as possible to the stated maximum number of hours as well as to perform the work within another definitely stated period of elapsed time.

The growth of the labor organizations and the enactment of local laws governing hours of labor have resulted in the necessity of a thorough knowledge on the part of not only the operators of street railways but labor executives as to the fundamental principles of schedule construction. In the past street railway companies, believing that they were making an arrangement of trips in the most economical manner, required men to work platform time of ten, eleven or twelve hours, and spread time of from twelve to twenty hours. It is true that thereby the crew force was reduced, which must be the goal in the interests of all concerned under any circumstances, but the distribution of the work was unequal and unfair. In those days there was no guarantee or minimum wage per day, and the result was that after all possible trips were crowded into schedule runs of long platform as well as outside time, proportionately few trips were left. But the trips that

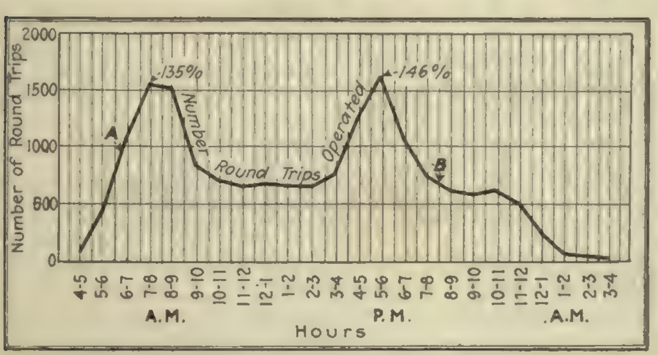


Chart I—Showing distribution of trips on Boston Elevated on Monday, April 12, 1920, a typical week day

were left were trips operated during the morning and evening rush hours, and in most instances they provided only a few hours' work each day for the men required to operate them. The result of this policy was that neither class of men engaged in the business was satisfied. Those men having a regular day's work disliked the long hours required to secure their day's work, and those having only a few trips during the morning and evening rush hours could not earn a sufficient wage to remain in the business. The result was a labor turnover of very substantial proportions, running in some instances to the equivalent of a complete reversal of the force during the year.

Failure to analyze the schedule problem was one cause for this, and while the street railways believed the trips were arranged in the most economical manner as far as cost was concerned, actually when one considers what the expense was, due to accidents and supervision to handle such a labor turnover, it is very easy to see that this was a "penny wise, pound foolish" policy.

It is hardly to be wondered at that when both types of men, namely, the so-called regular men as well as the extra men, were restless that attention was drawn to the subject of hours of labor on street railways and changes made designed to improve conditions.

During this period of the industry street railway executives were arguing that the old time schedules could not be changed without prohibitive costs, and labor executives were demanding working conditions that absolutely failed to fit the nature of the industry, and

TABLE I

Details of Trips Shown in Chart I

Hours	No. of Trips	Per Cent of Trips	Per Cent of Passengers	Average Revenue Passengers per Trip
4–5	81	0.47	0.23	27.55
5–6	453	2.67	1.72	37.22
6–7	1,064	6.27	6.15	56.77
7–8	1,546	9.11	9.94	63.15
8–9	1,507	8.88	8.91	58.07
9–10	841	4.96	4.02	46.92
10–11	701	4.13	3.81	53.32
11–12	657	3.87	3.76	56.26
12–1	677	3.99	3.92	56.98
1–2	650	3.83	4.69	70.81
2–3	650	3.83	4.84	73.19
3–4	757	4.46	4.84	62.81
4–5	1,253	7.39	8.10	63.46
5–6	1,621	9.55	12.40	75.20
6–7	1,048	6.18	5.47	51.25
7–8	737	4.35	5.00	66.58
8–9	619	3.65	2.77	43.94
9–10	580	3.42	2.69	45.54
10–11	616	3.64	3.36	53.50
11–12	517	3.05	2.15	40.77
12–1	248	1.46	0.74	29.46
1–2	64	0.38	0.23	35.11
2–3	43	0.25	0.16	36.02
3–4	36	0.21	0.10	29.33
	16,966	100.00	100.00	982,154*

*Total revenue passengers

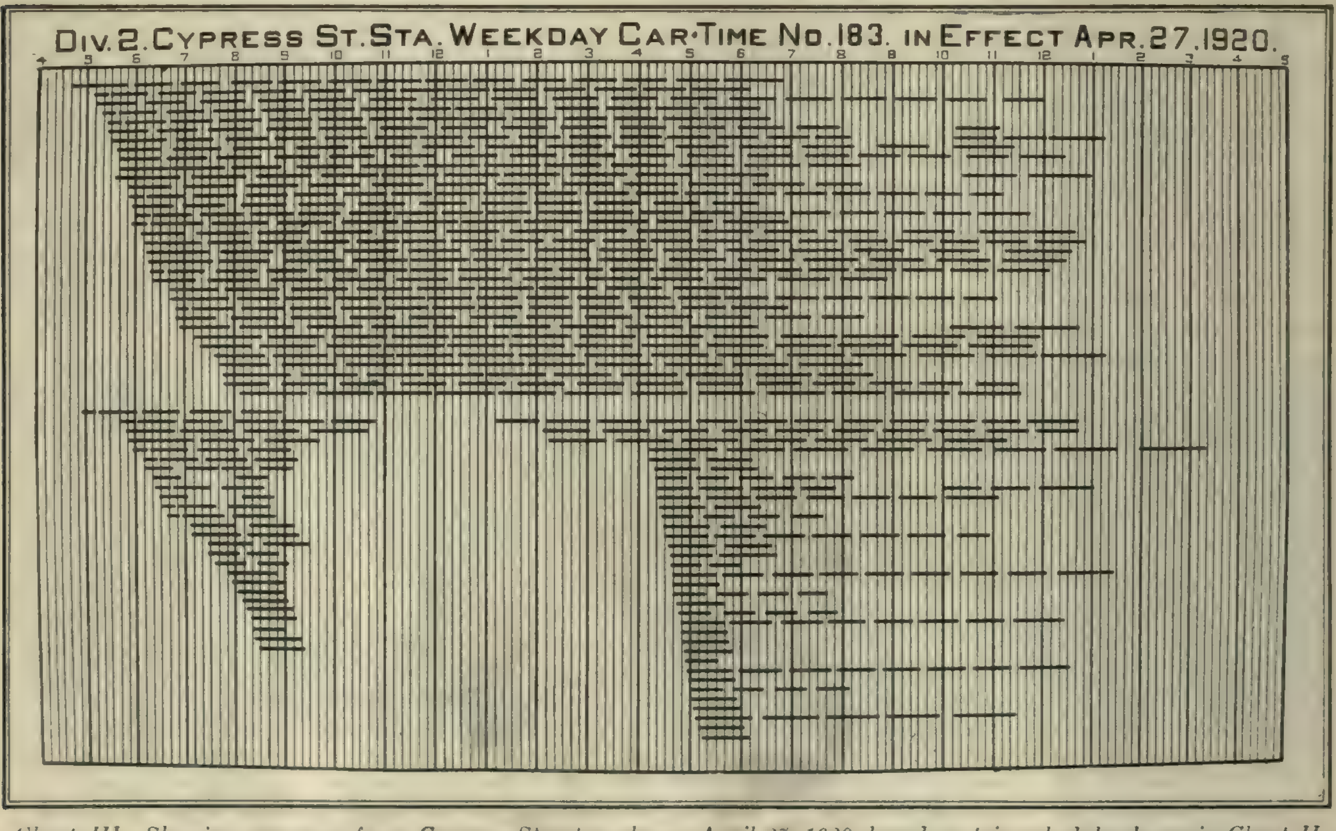


Chart III—Showing car-runs from Cypress Street carhouse April 27, 1920, based on trip schedule shown in Chart II in extreme cases would actually require double sets of men to perform the work in each rush hour. Meanwhile, but little study was given to the real economics of schedules, to devise ways and means with the smallest possible number of men or so to arrange the work as to provide as nearly as possible an equitable division of the work and yet impose no severe hardship on any group in the service because of spread of hours on platform service.

Many persons in those days discussed this confusing subject at length without a very definite idea of what it was all about. Today conditions are gradually becoming standardized, and the importance of a thorough knowledge of the subject by the executives of both the railway as well as the labor organization is appreciated. As arbitration becomes more frequent it is absolutely necessary that this subject be shorn of its mystery and both men and management talk the same language with reference to it, otherwise mistakes will surely occur from the decision of a neutral party who through no fault of his own has not had the fundamental economics of schedule construction properly explained both as regards fair working conditions as well as the ultimate cost to the car riders. A consideration, therefore, of the essential factors in schedule making is necessary.

TABLE II

Division of Schedule and Additional Runs by Platform Hours and Spread Hours

	Platform Hours 6-6½	6½-7	7-7½	7½-8	8-8¼	Total Runs	Spread Hours Eight Hours or Less	8-9	9-10	10-11	11-12	12-13	13-14
Conductors													
Schedule runs ..	1	44	440	863	134	1482	147	126	514	171	91	190	243
Additional runs ..			1	149		150	10		6	15	76	36	7
Motormen													
Schedule runs ..	1	45	399	845	151	1441	159	127	554	200	59	128	214
Additional runs			1	43		44	9			2	16	11	6

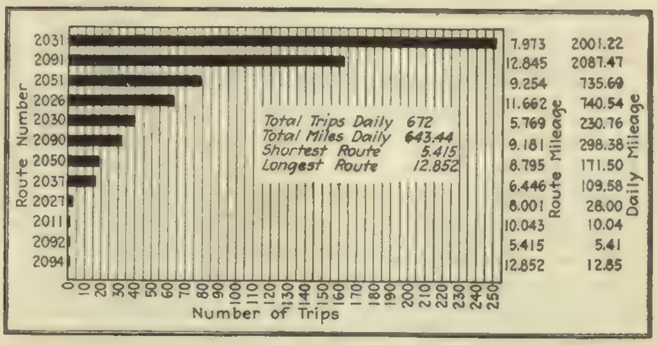


Chart II—Showing trips by routes from Cypress Street carhouse on April 27, 1920

TWO FACTORS IN SCHEDULE CONSTRUCTION

Two underlying factors in schedule construction are most important. The first of these is the relation between the base or normal schedule and the peak demanded in the rush hours, or, in other words, the percentage of excess of service in the rush hours over the non-rush hours. The second of these factors is the spread of hours which are required to insure the morning and evening rush hour trips in excess of the base schedule being operated by the same men. Both of these factors vary in different cities and even in different carhouses in the same cities. Cars serving a factory section of a city must, of necessity, have different hours than those serving a residential section where lawyers or bankers predominate.

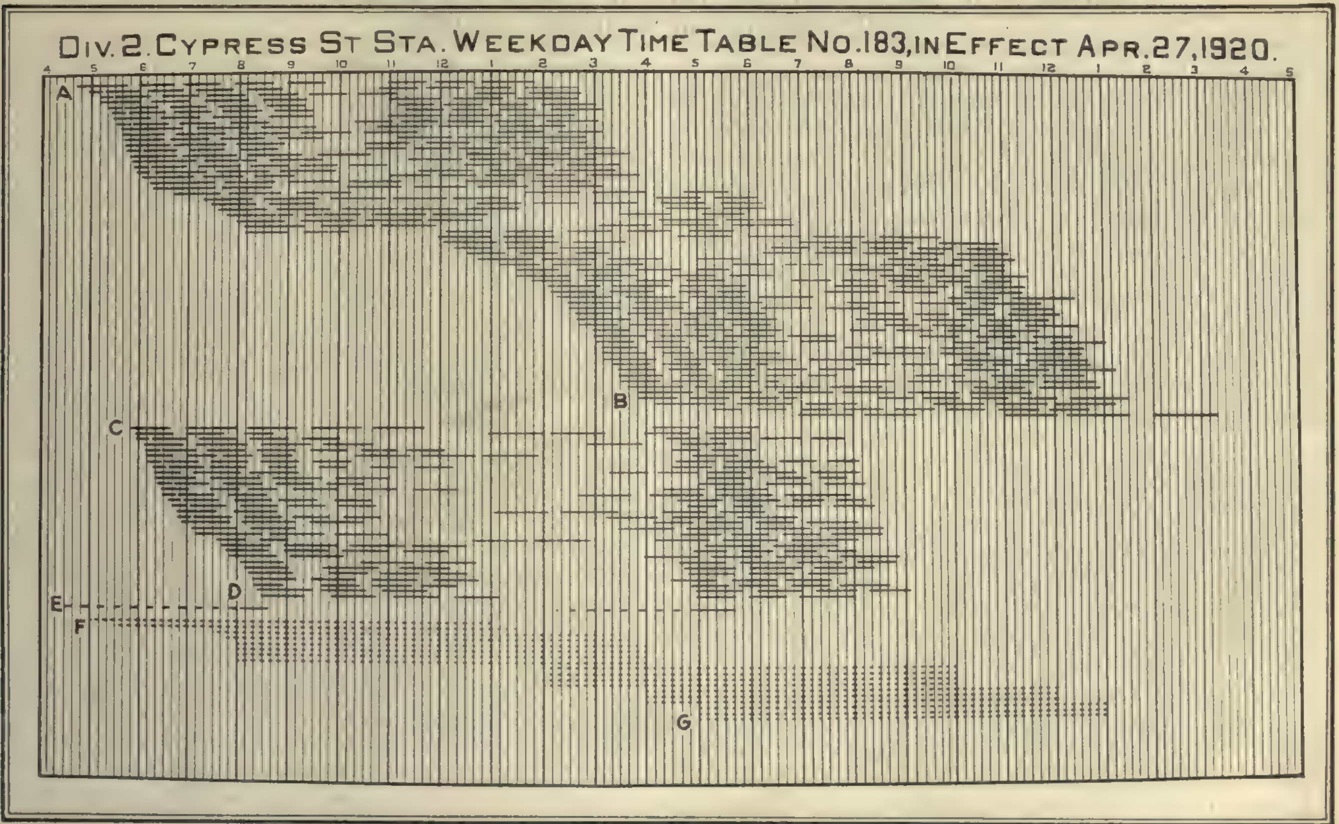


Chart IV—Showing crew-runs from Cypress Street carhouse, April 27, 1920, based on car-runs shown in Chart III

TABLE III

Daily Division of Time of Platform Men

	Total Hours	Per Cent of Total Hours
1. Actual platform time used on schedule (running time multiplied by the number of trips, plus layover time actually used)	19,733	.7126
2. Layover time on schedule between trips (considered as platform time)..........	3,250	.1174
3. Signing trips—putting up car, etc........	664	.0240
4. Extra time (three-piece run) ten minutes bonus paid..........................	13	.0005
5. Time added to bring platform time to pay period..........................	732	.0264
6. Men on additional runs doing other than schedule work during their cover period..	125	.0045
7. Time allowed on additional runs to equal eight hours' pay......................	794	.0287
8. Penalty time allowed for spread of outside hours..........................	611	.0221
9. Time of cover men other than substitution for schedule runs.................	773	.0279
10. Time paid for to bring cover men to eight hours' pay..........................	806	.0290
11. Overtime paid schedule men in addition to schedule pay time..................	88	.0031
12. Overtime paid cover men in excess of eight hours' pay..........................	91	.0033
13. Time delayed paid for..................	13	.0005
Total hours..........................	27,693	100.00

In order to understand these two factors the reader is referred to Chart I, which happens to show the total trips operated on the Boston Elevated Railway during each hour of the day. It will be noted that the trips required in the morning rush hour are 135 per cent greater than the base time-table requirements, and those in the evening rush hour are 146 per cent greater. It will also be noted that from the point marked *A* to the point marked *B* the necessary span of outside hours is approximately fourteen hours. These two factors in Boston make it absolutely necessary that a certain percentage of the men operating cars must have their day's work spread over a period not to exceed fourteen hours or else more men will be required to perform the work than is a fair and equitable burden upon the car rider. Even with a spread of fourteen hours many men will receive a day's pay, but are not required except for a portion of it, and if still more men were added much more time would have to be paid for to run the same amount of service. In short, in Boston the demands of the business require a minimum spread of fourteen hours on a certain percentage of the runs. Table I gives the information about the trips shown in Chart 1.

To appreciate the details which the schedule constructor faces, a glance at Chart II is sufficient. This chart indicates the relative number of trips on the several routes operated from a single carhouse. It also shows the different lengths of these routes and the total miles operated daily in covering the total of 672 trips. It will be observed that there are trips on long routes and trips on short routes and that the lengths and numbers of trips vary greatly on each of the routes. Some of the routes start from the point where the cars are stored, namely, the carhouse. In consequence, all cars that happen to be in the carhouse cannot be freely used, but a separate group of cars have to be "pulled out" and placed in service on such a line. This adds to the complications, for it is not a simple problem to combine trips into schedule runs if the terminals of the lines are widely separated.

The first important task in schedule making is to

TABLE IV

Distribution of Entire Operating Force of Conductors, Motormen, Guards and Brakemen as of September 14, 1920

	Rated at Station not Including Learners		In Other Depts. or Misc. Work Entire Day *		Sick, Off, Suspended, etc., Entire Day *		Working on Schedule or Additional Runs Entire Day		Men Listed for Scheduled Runs or Additional Runs Getting Off a Portion of Their Work		Reporting as Cover Men		Men Performing Work in Addition to Day's Work on Runs or Cover Work	
Stations	Cond.	M'men	Cond.	M'men	Cond.	M'men	Cond.	M'men	Cond.	M'men	Cond.	M'men	Cond.	M'men
Park St........	189	161	7	6	21	14	148	132	7	3	6	6	0	0
Milton.........	169	146	3	3	23	12	134	119	1	2	3	10	1	0
No. Point......	147	147	3	7	24	11	115	117	0	1	5	15	2	0
Lenox St.......	160	159	3	7	23	14	121	125	2	1	11	12	8	5
Jamaica Plain..	134	122	5	13	10	6	105	97	7	6	7	2	2	0
Reservoir......	123	90	2	3	15	5	94	68	4	2	8	12	..	..
Watertown.....	103	93	1	3	16	12	73	66	2	2	11	10	..	..
Sewall St......	113	123	2	5	18	7	90	92	2	4	1	15	1	2
Bennett St.....	160	173	6	14	20	13	116	131	5	3	13	12	5	5
No. Cambridge.	184	142	3	12	18	7	155	110	3	4	5	9	1	0
Eagle Street....	139	117	3	1	13	9	107	89	6	2	10	16	4	4
Clarendon Hill.	133	110	4	3	12	8	109	91	1	1	7	7	0	0
Salem St.......	130	130	1	7	15	10	105	104	4	5	5	4	3	2
Sullivan Square.	82	85	1	5	9	4	70	69	0	1	2	4	0	0
Everett........	47	47	0	1	6	3	31	37	3	5	7	1	0	0
Total........	2,014	1,849	44	90	243	135	1,578	1,447	48	42	101	135	27	18

	Rated at Station not Including Learners			In Other Depts. or Misc. Work Entire Day *			Sick, Off, Suspended, etc., Entire Day *			Working on Schedule or Additional Runs Entire Day			Men Listed for Scheduled Runs or Additional Runs Getting Off a Portion of Their Work			Reporting as Cover Men			Men Performing Work in Addition to Day's Work on Runs or Cover Work		
Rapid Transit	M	G	B	M	G	B	M	G	B	M	G	B	M	G	B	M	G	B	M	G	B
Sullivan Sq....	64	59	165	1	2	3	4	5	45	54	47	108	1	1	3	4	4	6	5	4	6	10	0	0
Dudley St..	65	58	163	4	3	6	4	3	35	52	44	117	1	0	3	4	2	4	0	3	15	0	0	0
Cambridge....	47	44	48	1	1	4	3	1	8	36	36	22	3	4	6	4	2	8	0	0	0	0	0	0
Total......	176	155	376	6	6	13	11	9	86	142	127	247	5	5	12	12	8	18	5	7	21	10	0	0

* These men are not available for car service during the entire day.

arrange the work of the cars and is commonly known as the car time. Chart III shows the same trips indicated in Chart II, arranged throughout the various hours of the day as the work of the various cars comprising the rolling stock at the particular carhouse.

It will be noted that here the same character of peak load condition is apparent. The lines that cross the entire sheet indicate base schedule cars or cars from which is secured maximum service, while during the hours from 6 to 9 a.m. and from 5 to 6 p.m. additional cars are required for a relatively small amount of work. In fact, five cars are required in the afternoon rush hour to perform but a single trip daily.

The arrangement of the car time as shown graphically requires careful and painstaking study in order that the service may be performed with the least amount of investment in rolling stock and, consequently, power requirements, and failure to arrange the trips so that a minimum of cars will be required may mean a very considerable capital investment as well as operating loss.

The traffic study determines the number of trips operated, the length of them, their exact starting time to produce the proper headway and the use of one-man cars, trailers or three-car train service. It is in this field that there is almost unlimited opportunity for constant study to insure the operation of that amount of service necessary properly to handle the traffic and no more. The car time represents the arrangement of the necessary minimum number of cars to render the service, and from the car time is arranged the hours of labor of the men who operate the cars.

Chart IV shows the arrangement of the same trips as shown in Chart III without disturbing their location from hour to hour into day's work for the platform men. From *A* to *B* are shown the runs of eight hours' platform time, completed within eleven consecutive hours' actual time. From *C* to *D* are shown the runs of eight hours' platform time completed within fourteen consecutive hours. In Boston 60 per cent of the runs are completed within eleven consecutive hours and 40 per cent between eleven and fourteen outside hours.

E represents a single run of the class known as additional runs, of which there are relatively few and which do not form a part of the percentage governing scheduled runs. These runs provide a definite full day's work, but not entirely of platform work. This particular run has but two definite trips, one at 8 a.m. and one at 5 p.m. During the rest of the time, shown in the chart as a dotted line, the crew is on hand to perform such work as may be required.

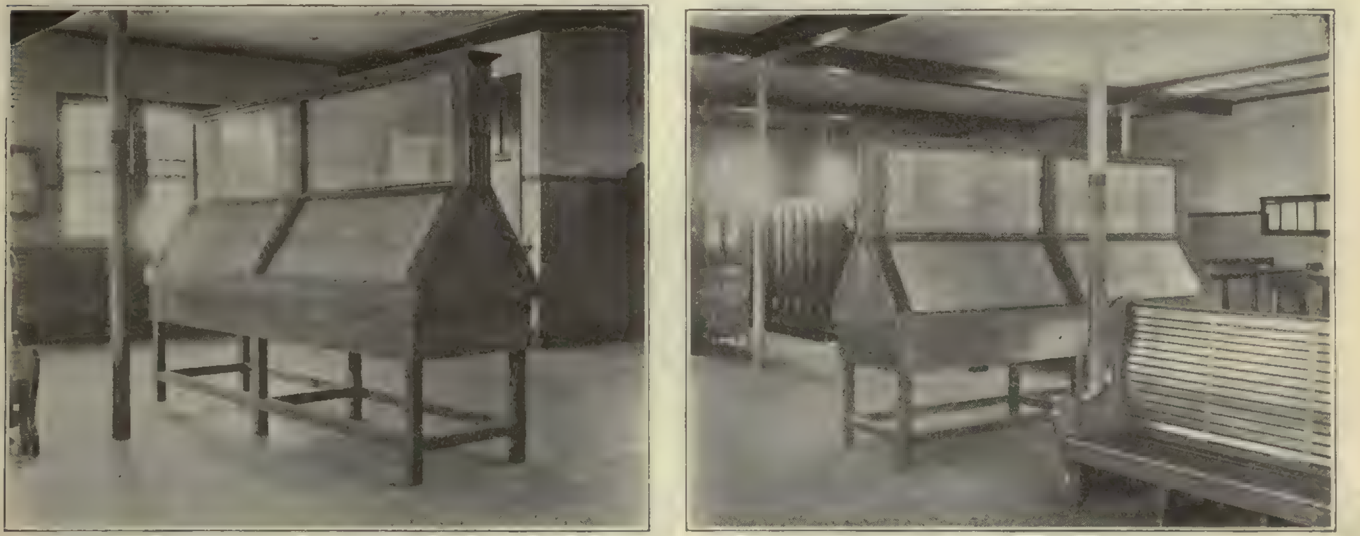
From *F* to *G* are indicated the periods of work of all men not having schedule runs. These periods are for eight hours' straight time and the men assigned perform such work as may be required, but remain available the entire period and receive pay for the full eight hours. These assignments also vary from day to day, both as to the number of them and the time they start and finish, depending upon the men absent from schedule runs and the traffic conditions of the particular day. They are known as cover periods and the men assigned are called cover men.

While this arrangement of work guarantees to all men working eight hours' pay, it meets the requirements of traffic with a minimum number of men and is sufficiently flexible to meet varying traffic fluctuations. It has an advantage both to the men and the company in that all schedule trips are operated each day by the same men, and the cover men have from day to day a definite assignment, as compared with the previous arrangement of work for extra men which was never the same and shifted daily from early trips to late trips, so that the extra man's time was almost never his own.

The number of runs and their spread of outside hours, as well as platform hours, are shown in Table II. When the schedules are completed it becomes important to know the exact number of man-hours utilized daily by platform work, and Table III indicates the subdivisions of time into its various factors.

The distribution of the entire uniform force is indicated in Table IV, showing various locations from which men are rated and the number actually working on runs, doing miscellaneous work, absent, etc.

Given reasonable working conditions which fit the peculiar nature of the street railway industry and fair compensation, it seems to me the time has arrived when the rank and file of the employees on the platforms ought to exert every effort to assist in the efficient and economical operation of street railway properties in the interests of the car riding public. Whatever they do to increase production by the elimination of lost motion and inefficiency will surely result in mutual benefit to men, management and car riders.



Views in lobby of Clarendon Hill carhouse, showing bulletin board for display of time-tables

Present and future tendencies. Problems and methods of attack. Results of the application of transportation fundamentals in American cities

Surface Transportation in Congested Districts

By *John A. Beeler*

Consulting Engineer

A double berth loading platform on Broad Street, Newark, N. J., which economizes stopping time

THE function of any transportation system is to give service, and in that word are centered all the operating problems of the transportation industry. The word "service" today in connection with transportation means good service, *i.e.*, the transportation of people quickly with comfort and safety and at a reasonable charge.

Good transportation service is as absolutely necessary to the growth and prosperity of any city today as air, water or light. In fact, transportation to a large community is second only in importance to air and water.

Good transportation service is essential to business prosperity and it is safe to say that 80 per cent of the mercantile business of the country is located along car lines. The merchants of Bridgeport, Conn., recently discovered that a cessation of street car service meant a material loss in their receipts even though, apparently, jitneys handled the traffic adequately. Other cities have furnished similar examples.

When municipalities realize this fact and also that the relief of traffic congestion in congested districts is a primary element in good transportation there will be a great improvement in the community prosperity. Street cars will be given the right of way over general traffic because an increased speed for street cars means an increase in speed of all street traffic.

On the other hand, the railways themselves must understand they are now dwelling in a competitive age, that the private automobile and the motor bus have come to stay and that the pedestrian is always to be reckoned with. The street railways, although they have been unjustly handicapped in many ways because the other modes of transportation have been favored by their failure to overcome local conditions of congestion, have themselves accelerated the development of the motor bus and the private automobile and have encouraged the pedestrian as competitive transportation agencies.

There is today more opportunity for improving the handling of traffic in our cities than in almost any other field of endeavor. The conditions in every city differ in detail, but the general methods for improving service are fundamental. The specific application of the needed remedies must be precedea by a correct diagnosis of the troubles. In the following paragraphs an attempt will be made to point out some of the points of attack in an effort to improve the transportation conditions in a city.

A TRAFFIC STUDY ESSENTIAL

One of the first essentials for improving the service is to secure the co-operation of the municipal and railway authorities in an open-minded study of the situation. This study should not be confined to the railway service but should cover the traffic systems as a whole. The speed of all cars on all lines, the headway, the reg-

Kansas City has put in a number of temporary loading platforms

Instruction sign giving directions for boarding cars in Kansas City

ularity of operation, the habits and customs of the passengers, the traffic conditions in congested districts and at busy intersections, the routes, the tendency in city growth and development are all factors to be considered.

The prime requisites of service that are demanded today by the public are dispatch, regularity and frequency, and the more methods of transportation available the more transportation will be used. The luxury of yesterday becomes the necessity of today. Time saving is demanded in all branches of industry. A few years ago comparatively few people rode on the Twentieth Century Limited. Today this is one of the heaviest trains between New York and Chicago, and two or three sections are frequently required. Time is money now more than ever. Cutting down wasted time means not only decreased expenses but increased receipts per car-mile because more passengers are attracted to the cars.

The development of transportation methods follows closely the development in the speed of transportation vehicles. Take the horse car, the cable car, the electric car, the automobile, the elevated and the subway. Each has shown an increase in speed over its immediate predecessor.

Quicker transportation does not mean higher maximum speed, but it can be obtained by a lessening of road delays, overcoming congestion, more direct routing, quicker loading and unloading, and regularity of service. These will be considered briefly in the order named.

CUTTING DOWN ROAD DELAYS

Much of the time lost by cars through road delays would be avoided if all companies realized the value of seconds. Many of them do not seem to understand that a stationary car costs almost as much in operating expenses per car-hour as a moving car. Transportation service and income depend on the distance moved by each transportation unit in unit time. Receipts are proportional to car-miles, but expenses are very nearly proportional to car-hours. One company may be prosperous while another is bankrupt, even though they may have earnings at the same rate per car-mile and make the same number of car-miles per annum, because the cars of the first company average more miles per car-hour than those of the second company. A difference of one mile per hour may make or break a company.

A simple and direct attack can be made on this cause

The loading platforms in Newark, N. J., are lighted by lamp posts at each end

The "car-always-in-sight" principle is illustrated in this view from Vancouver, B. C.

of delay by determining from the studies of the speed made on the different routes what schedules are too slow and then applying remedies to each route that will relieve conditions. Waste time may be due to many factors, such as too many so-called safety stops or fire stops, stops too close together, stops in wrong locations, unnecessary positive stops. One of the greatest factors of road delay is the so-called safety stop. At grade crossings where the conductor dismounts and flags the street car across the railroad tracks much time frequently is wasted. This is anything but a safe method, as experience has demonstrated that nine times out of ten the conductor simply goes through the motions, thus relieving the motorman of responsibility. In one instance, which came under my notice recently, a car stopped at a crossing and the conductor walked across the track to a distance of about 25 ft. on the other side, where he pulled a lever that operated a derail which permitted the street car to cross the railroad. After closing the derail on looking up he was amazed to see a freight engine and caboose between the street car and himself. Where the view is unobstructed it is much safer to place the responsibility undividedly on the motorman. A railway flagman or gateman, who is familiar with operating conditions and schedules, is the safest man to rely upon if a grade crossing has to be flagged. These old railway men know when to expect the trains, they can detect the rumble of the approaching train on the rails, they are not dazzled by the change from light to dark as is the street car conductor.

Another element that causes waste road time is slipshod instruction of trainmen in handling of cars, especially in accelerating and braking. A normal rate frequently found is 1 m.p.h.p.s. when it should be nearer to 2 m.p.h.p.s. Stops may also be placed in the wrong position. On single tracks, cars can often make their stops on the sidings, yet more frequently they stop on either side of the siding and block the line. Frequently much congestion is caused for the reason that stops are made by cars before passing the diverging point in the lines. Instead of passing through the neck and out beyond, they stop in the neck, delaying those behind.

Electric switches and automatic signals can be used to advantage to save time. Recently I observed a place where it required a minute for the motorman to walk over, throw a hand signal and return to the car. Today a minute is worth 5 cents, as the average car-hour expense is at the rate of $3 in these days of high wages. The saving of a total of five minutes on a line with a five-minute headway will permit the saving of $15,000 per year and make available one car for additional service.

TIME CAN BE SAVED IN FARE COLLECTION

The introduction of fractional rates of fare instead of the even 5-cent fare has caused a loss of from ½ to 1½ m.p.h., due to increased difficulties in fare collection. Metal tickets, front end collection, and prepayment areas rightly placed may help to eliminate this loss. The method of making change is an important factor. In general, with fare boxes, it has been demonstrated that where a metal ticket is returned to the passenger to place in the box with change for the balance due, collections are accelerated.

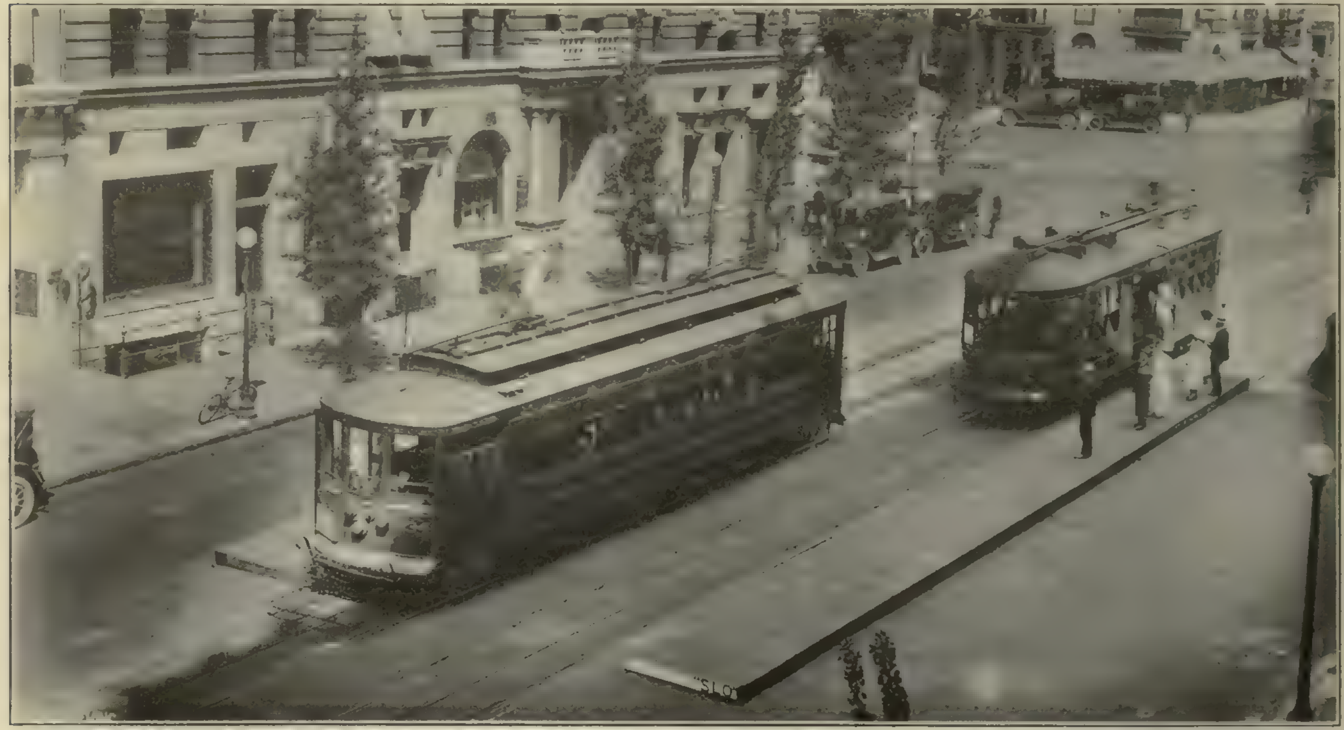


Photo by Harris & Ewing.

Loading platforms at New York Avenue and Fourteenth Street, Washington, D. C.

Front end collectors at points where many passengers board the cars and prepayment areas, where they can be installed at not too great expense in central localities, facilitate car movement. The prepayment area for the passenger means also that he has a centralized loading point where he can wait in comfort, secure a seat and usually be more sure of cars being on schedule time. For the railway company it often obviates the necessity of issuing paper transfers and thus saves expense, delay and improper use of the transfer privilege.

On many systems where it is not possible to have such stations in central areas they can be installed to advantage in suburban centers. Trunk lines can enter these terminals and feeder routes using safety cars or motor buses can be used to distribute the traffic in the suburb. The use of a terminal station is not usually advisable where cars have to go considerably out of their way or through congested districts to enter it.

SPEEDING CAR MOVEMENT IN CONGESTED DISTRICTS

Where the streets are taxed to capacity, one of the first remedial steps to be taken is to restrict the parking of automobiles. This should be done without fear or favor, and the loading and unloading of heavy trucks should be reduced to a minimum, especially during the rush hours.

Traffic regulations are difficult to enforce but they are essential to expedite car movements across intersections and between loading points in the congested districts. The street car should have the right-of-way over general vehicular traffic as it carries more passengers per unit, and its passengers use it from necessity more than for pleasure. Another reason is that the street car is on fixed tracks and cannot dodge in or out of the traffic stream. Experience has proved that an increase in street car movement means a similar increase of vehicular traffic movement and that all traffic is expedited by co-ordinating its movements with those of the street car. In one city where the speed of the street cars in the congested district during the rush hour was increased 68 per cent, the actual number of street cars passing through the district per unit time increased 58 per cent. This gave an actual increase of 58 per cent in the service rendered during the rush hour and did not require a single additional car.

Double berthing of cars helps to speed up traffic as it gives schedule leeway and permits of passing at intersections more than one car at a time. It is particularly beneficial when there is a very frequent headway. Actual trial has demonstrated that the more opportunity there is for double berthing the less the necessity for it, as cars more quickly resume their normal spacing.

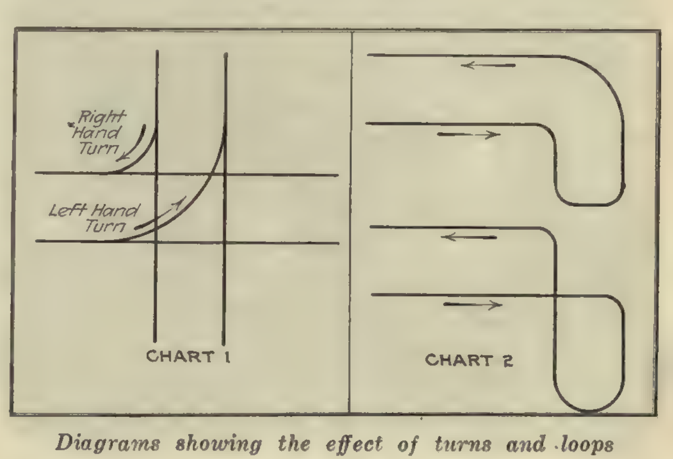
Much can be done also with the spacing of car stops. Too close spacing of stops will demoralize schedules, especially during the rush when all stops are being made and when service is most needed. Extra cars then added usually will then simply make extra stops and not add to the capacity of the line. They may be in the neck of the traffic bottle or too near the point of greatest vehicle congestion.

Custom fixes methods for doing things and often is hard to overcome. Where a merchant objects to a beneficial change in street conditions, such as a change of a stop, he must be shown that what he objects to from a selfish standpoint is really a benefit to him, because it means an increase in the number of people who can travel to and from his store in comfort and not a mere congestion of people at that point. To reduce this congestion means a greater number of cars per hour and faster service. A decrease in the trip time means an enlarged area available for his customers.

SKIP STOP VERSUS EQUALIZED STOP

The theory underlying the skip stop for both congested and outlying sections of the city is good so far as it means the elimination of unnecessary stops. The name "skip stop," however, is unfortunate because it gives the impression that the public is being deprived of a convenience. This handicap in its name, combined with poor judgment in the establishment of stops, largely explains the unpopularity of the system in many cities. A better name for a plan of re-establishing stops is "equalized stops." The stops should be placed where they will serve the greatest number and as nearly as possible on the basis of equal spacing. This is a fundamental requirement for good service. The number of stops per mile not only limits the speed but controls the amount of service possible to render with a given equipment. When stops occur eight to the mile, which is about right for urban service, the motorman must apply the brakes, bring the car to a stop, open the doors, wait until the passengers are on or off, close the doors, accelerate the car and get it back to speed, and do all of this once in every forty-five seconds, when the average speed between stops is 10 m.p.h. It can be readily seen that it is very difficult, where the number of stops made actually exceeds eight, to give good service. To eliminate every other stop is irrational as often stops have been placed at greatly varying distance, and some have been incorrectly located, so that conditions might be made worse instead of being improved by such a method for fixing stops.

In one large city where the stops were placed on an average of 700 ft. apart in the congested districts and in some instances 1,000 ft. not one complaint was received from the public, for the reason that congestion was relieved and service greatly bettered.



Diagrams showing the effect of turns and loops on traffic

PRINCIPLES OF CAR ROUTING

A great improvement in traffic conditions can be obtained in most cities by properly rerouting the cars. The routes in many cities were established more than a generation ago, and through the development of cities and of transportation agencies, conditions have utterly changed in many localities. Often rerouting combined with a rescheduling so as to fit the cars to the traffic requirements will release many cars for additional service where badly needed. This enables the cars to serve the public better and at the same time increases the earnings. In one large city, for instance, without any change in tracks or equipment, a general adjustment of stops and loading methods generally enabled 100 cars to do the work for which 113 were formerly required. This was followed by a new routing schedule which further increased the capacity of the original 100 cars, enabling them to do the work of 126. This was equivalent to a gain of twenty-six additional cars for each one hundred operated without any increase in investment or fixed charges.

The fundamental purpose in determining car routes is to secure *direct* routes. That is to say, the object is that the maximum number of passengers should reach their destination quickly and as far as possible without transfer. In through-routing the purpose is to balance traffic through the center of the city and thus save car mileage.

Car mileage in the congested district can also often be saved by a rearrangement of tracks and loops. Frequently a through routing can be effected in the congested district where lines are equally balanced, much delay avoided and substantial savings effected.

The effect of right-hand and left-hand turns depends on the width of the street and the traffic conditions. In general a left-hand turn delays cars on the other tracks and a car takes 20 to 40 per cent more time to make such a turn than to turn on a right-hand curve. In a recent test the average time on a left-hand curve was fourteen seconds as compared to ten seconds on a right-hand curve. This time element is important as time cannot be made up readily in congested districts.

Chart 1 shows the effect of the right-hand and left-hand curves under the conditions assumed. The car must travel a greater distance in the intersection and also tends to impede other car movements across the intersection on the other tracks.

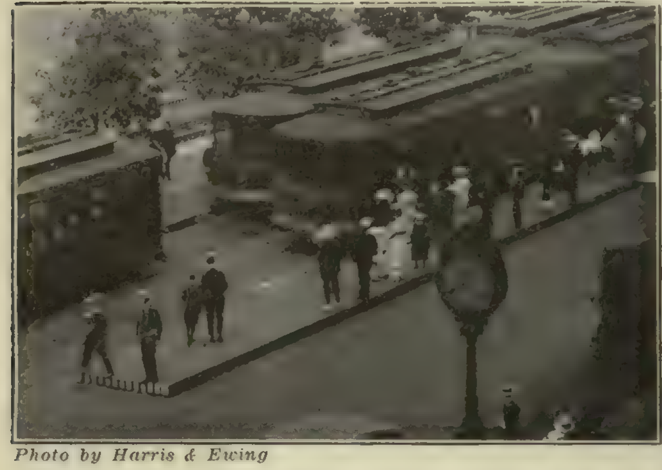


Photo by Harris & Ewing

Loading platform at Ninth and F Streets, Washington

Chart 2 has been drawn to illustrate two methods of providing for loops in a congested district. The relative merits of the two methods depend upon the extent of the congestion at the corners where the turns occur. In general, the number of left-hand turns should be reduced to a minimum, and at many of the congested street intersections in large cities all left-hand turns for vehicles other than the street cars have been prohibited in order to expedite traffic.

LOADING AND UNLOADING

The possibility of the loading platform in relieving street congestion in cities has not been realized or utilized to the extent it should have been. The loading platform functions to relieve congestion on sidewalks, speeds up street car schedules, and makes for the comfort, convenience and safety of the public.

The car patron standing on the leading platform is safe from the moving crush of vehicular traffic and out of the way of the pedestrian. He escapes a last minute dash through the street vehicles, and general street traffic can move while the street car stands still without danger or detriment to the car patron. From the railway standpoint the possibility of the loading platform is also important. It saves at least ½ second per boarding passenger exclusive of the time saved by the car waiting while passengers cross the traffic stream to reach the car.

The loading platform is not suitable to very narrow streets, but if the distance between the car tracks and the curb on one side is wider than is absolutely necessary to accommodate one line of moving vehicles and not wide enough for two, space that otherwise would be practically wasted is often available for a loading platform. For instance, in a street where there is 13½ ft. between the sides of the car and the curb and only 8 ft. is required for the line of moving vehicle traffic, there is available 5½ ft. of waste space. A width of 3½ ft. can be utilized to advantage in this case for a loading platform, leaving 10 ft. available for vehicular traffic, which is ample to give satisfactory clearance.

Successful loading platforms range from a minimum of 3½ to 6 ft. in width. The usual width is about 5 ft. They should equal one car in length or the length of two cars at double berthing point.

The loading platform should be at least 9 in. high to avoid danger from vehicles and to offer to its patrons a feeling of security and distance from the moving vehicles near the platform.

The loading platform functions properly when the people are on the platform before the car arrives. Double berth platforms are best and are successfully used in many cities at heavy traffic points.

Much can be done in speeding the loading and unloading of passengers, also, by a proper design and arrangement of car doors and steps. In general every entrance and exit to a car should permit a double file of passengers in order to avoid delay.

Most street car schedules have been made by a cut and try method, and the tendency has been to add time as congestion increased instead of attempting to relieve the congestion and tighten the schedule. Without increasing the maximums, it is sometimes assumed that the higher the average rate of speed the more numerous the accidents, but this is not borne out by the facts. I recall one instance where a change in speed from 8 to 10 m.p.h. was accompanied by a reduction in accident cost of from 4 per cent to 1 per cent of the gross receipts.

Faster and more regular schedules mean more business. A pedestrian looks on a street car with contempt if he is walking faster than the car is moving, but often will ride a short distance if the cars move much faster than he can walk. Greater regularity in schedules is equivalent to additional cars. A difference of one minute each way on a ten-minute headway for two successive cars means that they are 20 per cent off the schedule spacing, while with a five-minute headway they would be off 40 per cent.

The secret of maintaining a good schedule is in keeping every one concerned attending to business, and no one item is more essential than to maintain correct running time for cars throughout the system. This involves a good method of time checking at terminals and on routes as well as accurate watches for trainmen and inspectors. The inspector should check the trainman's time whenever he boards a car. There are today too many starters not starting, inspectors not inspecting and dispatchers not dispatching on railway systems all over the country.

Increase in car speeds can be accomplished only by detailed attention to several sources of delay which are enumerated and commented upon

Increasing Schedule Speed on City Railways

By Victor B. Phillips

Assistant to the Vice-President Cleveland (Ohio) Railway

Cleveland Railway's older type of train with center-entrance, center-exit motor car

QUITE aside from the advantage of faster and therefore better service to car riders, higher schedule speeds may be urged on the grounds of substantial money savings. Two items of cost, namely, platform labor and fixed charges on rolling stock, bear a very simple and fixed relation to schedule speed. For given traffic conditions it is necessary to supply a certain number of car-miles in order properly to handle such traffic. If by means of higher speeds it is possible to make a car and its crew cover twice as many car-miles in a given time it is evident that the cost of platform labor and the fixed charges on cars will be cut in half. Inasmuch as these charges constitute more than one-third of the total cost of operation, maintenance and all fixed charges, it follows that any substantial reduction in these charges is a matter of importance.

In the case of the Cleveland Railway, for the year 1919, with a schedule speed of 10.82 m.p.h. (without layovers), platform labor cost 11.9 cents per car-mile and fixed charges on cars, including interest at 6 per cent per annum, amounted to 2 cents per car-mile. The latter figure includes only 1 per cent for depreciation due to obsolescence, as it is considered that depreciation in general is a function of car-miles and that obsolesence is of relatively little importance.

It is, of course, quite likely that the cost of equipment maintenance per car-mile would be materially affected by change in schedule speed. The cost of painting per car-mile would be somewhat less, inasmuch as the condition of paint is a function of time rather than of mileage. On the other hand, it is likely that damage to car bodies from collisions would be substantially greater with the higher schedule speeds. On the whole, it may be said that the cost of equipment maintenance per car-mile will not be appreciably changed by an increase in schedule speed.

To what extent accident claims would be increased by higher speeds is problematical. Where increases in schedule speed are contemplated, this item should be given consideration. Examination of accident and traffic statistics for the Cleveland Railway over that period during which schedule speeds were increased fails to show any marked increase in accidents from this cause.

Fig. 1 shows graphically the relation between schedule speed and the cost of platform labor plus fixed charges on cars per car-mile.

There are many ways of increasing schedule speed. In any particular analysis the cost of putting into effect any one or several of these means of increasing speed must be deducted from the savings mentioned above. The more important of the many ways of increasing speed are the following:

1. Increase in rate of acceleration.
2. Increase in maximum speed.

3. Increase in rate of retardation.
4. More rapid loading and unloading.
5. Reduction in number of stops.
6. Elimination of delays due to street traffic.
7. Use of loops rather than switches and Y's, especially in congested districts.

The above will be considered in order.

In Fig. 2 are shown a number of speed-time graphs based upon actual tests made on the Euclid Avenue line of the Cleveland Railway system. They are shown one above the other so as to have a common base line of time. The total area under each of these graphs represents distance. Graphically, our problem is to increase this area as much as possible.

TABLE I

Statistics of Train Operation by Seventeen Companies

Name of Company	All Day-Train Operation as Well as Rush Hour	Make-up of Train	Seats per Motor Car	Seats per Trailer	Average Schedule Speed of Train in m.p.h.		Average Schedule Speed of Single Cars in m.p.h.		Maximum Number of Trains Past Any Point per Hour per Track
					Rush Hour	Non-rush Hour	Rush Hour	Non-rush Hour	
Boston Elevated Railway......	Yes	M. C. & T. M. U.	52; 56	62	9.92	9.92	9.92	9.92	102
All Brooklyn Surface Lines....	Yes	M. C. & T. M. U.	48 M. U.-58 ea.	62	8.72	10.47	8.72	10.47	..
Capital Traction Company.....	*No	M. U.	48	48	8.50	8.50	8.50	8.50	..
Cincinnati Traction Company..	Yes	‡M. C. & T.	35	60	8.40	.....	8.77	8.95	8
Cleveland Railway............	Yes	M. C. & T.	56	60	10.28	10.91	10.30	10.82	35
Detroit United Railways.......	Some lines	M. C. & T.	43	56	10.25	10.25	10.25	10.25	63
Louisville Railway............	*No	M. C. & T.	45	45	10.15	.....	10.15	10.15	10
Memphis Street Railway.......	†Yes	M. C. & T.	44	56	10.13	†10.36	10.36	10.80	17
Milwaukee Elec. Ry. & Lt. Co..	*No	‡M. C. & T. ‡M. U.	46-59; 59 52-52; 48	54-59; 59 46-54; 56	9.22	.....	9.22	9.75	...
Montreal Tramways Company.	†Yes	‡M. C. & T. M. U.	42	45	8.59	9.40	8.59	9.46	30
New Orleans Ry. & Lt. Co......	Yes	M. C. & T.	44	62	9.02	12.03	8.07	9.06	10
New York State Railways, Rochester Lines............	*No	M. C. & T.	48	52	8.40	.....	8.40	8.80	130
Omaha & Council Bluff Street Railway..................	*No	M. C. & T.	47	60	8.77	.....	8.77	10.50	8
Peoples Railway, Dayton, Ohio.	*No	M. C. & 2T.	44	60 each	8.88	.....	9.00	9.00	...
Pittsburgh Railways...........	*No	M. C. & T.	42; 56	60	9.35	.....	9.35	9.42	35
Public Service Railway........	*No	M. U.	50	50	8.75	.....	8.75	9.30	...
United Railways Company of St. Louis..................	Yes	M. C. & T.	57	68	10.08	10.54	10.08	10.54	12

* Operate during rush hour only.
† Operate on regular schedule Saturday and Sunday only.
‡ Motor car with trailer equipped with control apparatus.

M. C. & T.—Motor car and trailer.
M. U.—Multiple unit.

GETTING THE CARS UNDER WAY MORE QUICKLY

Acceleration may be increased in three ways, namely, improvement in line voltage, use of more powerful motor equipment and use of lighter cars.

To illustrate: The diagrams in Fig. 2 represent conditions at the rush hour in Cleveland, at which time line voltage is considerably lower than at other times and at which time trailers are used. To show the effect of increasing the voltage and taking off the trailers, the graph B^1 has been drawn and superimposed on B. Graph B^1 has been so laid out on this chart that the distances between stops, as represented under each cycle of the two graphs, are the same for B and B^1. The braking rates are the same in the two cases.

From this chart it is found that the more rapid rate of acceleration represented in B^1 results in an increase in schedule speed from 9.92 m.p.h. to 10.59 m.p.h.

The difference in voltage which was in part the cause of the more rapid acceleration in this case was 54 volts. The corresponding increase in speed represents a saving in platform and fixed charges of approximately 1.1 cents per car-mile.

Regarding the matter of weight, in the last few years some improvement has been effected in the design of street cars whereby the weight of the car is materially reduced for the same carrying capacity. This reduction in weight has been effected largely by a better distribution of steel and has amounted to as much as 15 per cent of the weight of the motor car.

One of the arguments in favor of the modern one-man car has been its greater rates of acceleration and braking, which have been possible on account of the light weight of the car per passenger carried. This last is especially true during the non-rush hours when cars are not loaded to capacity.

NOT MUCH CHANCE TO INCREASE MAXIMUM SPEED AND BRAKING RATE

It will be seen from the speed-time graphs in Fig. 2, which are based on average data for a number of runs, that cars do not reach the maximum possible speed. Under average conditions the motorman starts coasting and then applying the brakes before sufficient time has elapsed to permit such maximum possible speed to be attained. For this reason, under the traffic conditions which usually obtain in city streets, there is little to be gained by equipping cars for a maximum speed which is almost never reached.

Due to the high schedule speeds already in effect in

Cleveland, the rate of retardation represented by the speed-time graphs shown in Fig. 2 is very nearly the maximum obtainable, and presumably this is rather generally the case. Of course, the effect upon schedule speed of an increase in the rate of braking has already been indicated in the example of increased acceleration cited above. This effect upon schedule speed is precisely the same for the two cases.

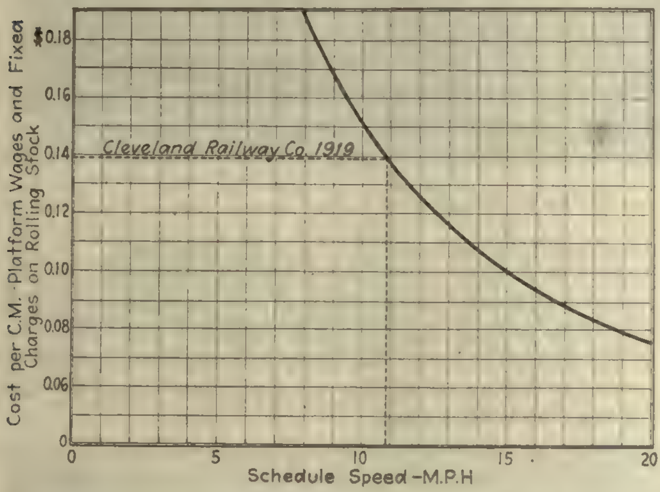


Fig. 1—Curve showing decrease in operating costs produced by increase in schedule speed

MORE RAPID LOADING AND UNLOADING IS IMPORTANT

The relative importance of rapid loading and unloading in its effect on schedule speed can readily be seen by referring to the diagrams in Fig. 2. The average length of stop on the Euclid Avenue line of the Cleveland Railway during the rush hour is 7.43 seconds in the congested district and 6.9 seconds in the non-congested district. Both of these figures are somewhat less than those which obtain in other cities where similar conditions exist.

In Cleveland a large amount of time has been saved by operating cars leaving the congested district as pay-leave cars and those coming toward the congested district as pay-enter cars. By this arrangement fares are collected in the outlying districts where people get on and off cars in relatively small numbers. A train comprising a center-entrance and center-exit motor car and similar trailer can be loaded with a total of 200 passengers in one minute by using the pay-leave system. This rate of loading is regularly accomplished on the Cleveland Railway system in the case of cars loading at the Public Square during the rush hour. On the crosstown lines where there is no single congested district, but instead are numerous points where heavy loading and unloading occur, the Peter Witt car and Peter Witt system of pay-as-you-pass is used. On these lines it has been found that this system is by all odds the most satisfactory and saves a great deal of time. In general, the more important methods of speeding up loading and unloading of passengers are as follows:

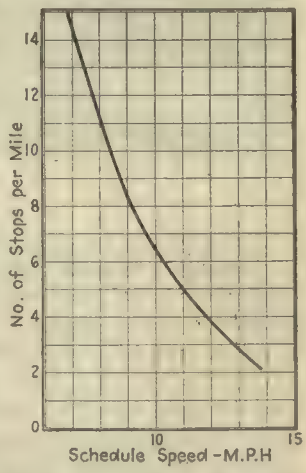


Fig. 3 — Stops per mile plotted against schedule Speed

1. The pre-sale of tickets and tokens in a large number of conveniently located stores.
2. The pre-collection of fares by passing passengers through a gate or even by using a portable fare box and stand placed on the streets at the more congested loading points.
3. The use of tokens or tickets where the fare is an odd number of cents.
4. Various arrangements of loading stations, such as safety islands, platforms, the queue system, aisles, etc.
5. Various arrangements of car entrances, exits and location of fare box.

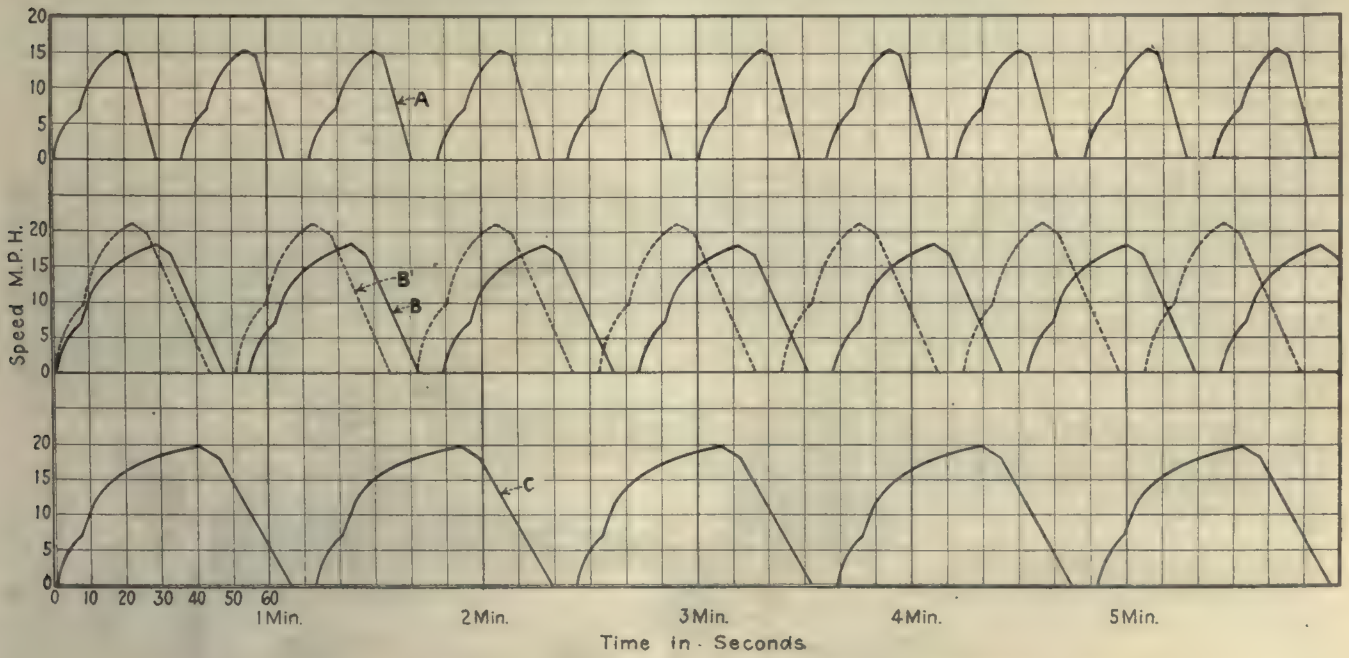


Fig. 2—Time-speed graphs for the determination of the relation of schedule speed and the frequency of stops

Latest type of train used by Cleveland Railway

It is difficult, in an article such as this, to generalize or to present specific data that will be of general value regarding the effectiveness of these several means of speeding up the loading and unloading of cars. Each depends upon local conditions.

The pre-sale of tokens and tickets in stores has been used to good effect in Baltimore. The pre-collection of fares by means of portable fare boxes and stands placed on the streets at the congested loading points is now being successfully used in Kansas City. The Cleveland Railway in certain cases is using the pre-collection system, notably during the hours of congested traffic at amusement parks and in certain factory districts.

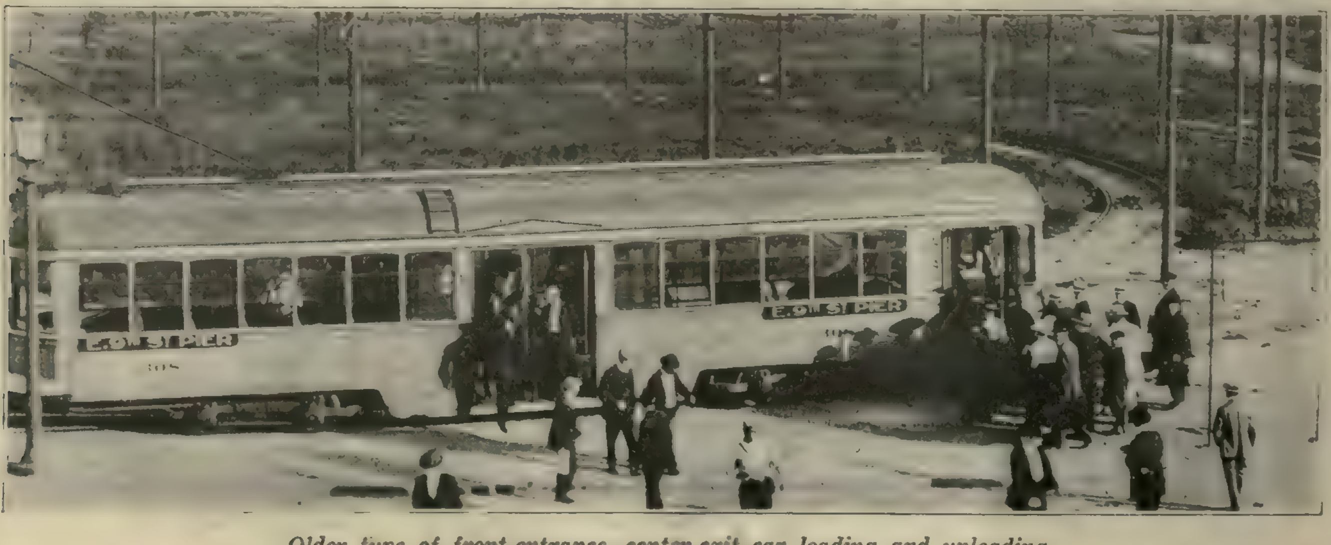
With regard to the arrangement of car entrances and exits, the writer believes that the Peter Witt car represents the last word. Cars of this type recently purchased by the Cleveland Railway are provided with a wide front entrance which permits the simultaneous loading of two streams of passengers. In these same cars a panel has been introduced between the center-exit doors, the fare box being placed between these doors. Passengers from the front half of the car are unloaded by the forward center exit door, paying as they pass the fare box. Passengers from the rear half of the car are unloaded by the rear center exit door. Passengers passing from the front to the rear of the car pay as they pass the fare box. These passengers are generally the long-ride passengers, and in this way the long ride and short ride passengers are kept separate, as is desirable.

Several years of experience with center-entrance, center-exit cars, in which there is a well in the center of the car opposite the doors, has developed many unsatisfactory features to this arrangement. It has been found that the well, with step leading to the forward and rear parts of the car, is the cause of much confusion around the doors and fare box. In this type of car accidents during boarding and alighting and those involving falling inside the car are double what they are for the Peter Witt type.

Graphs A, B, and C in Fig. 2 have been laid out with a view to showing the effect upon schedule speed of frequency of stops. In all three graphs the same acceleration rates have been used. Braking rates are somewhat greater in the case of graph A as compared with graph B, and in the case of graph B as compared with graph C. This must necessarily be the case inasmuch as the somewhat slower rate of braking must be used in braking from a higher maximum speed.

By comparing the areas under the three graphs, the relation shown in Fig. 3, between the number of stops per mile and schedule speed, has been determined for the particular conditions obtaining during the rush hour for a motor car with trailer on the Euclid Avenue line of the Cleveland Railway. It will be seen from the shape of this curve that the schedule speed is affected relatively more as the number of stops per car-mile is reduced. In other words, the slope of the curve is greater at the right. The reason for this is that where the number of stops is comparatively small, cars have more opportunity of reaching a high maximum speed.

By considering the curve of Fig. 3 in connection with the curve of Fig. 1 it may be seen that reduction in the number of stops per mile from eight to four will effect an increase in schedule speed from 9.2 m.p.h. to 11.8 m.p.h. and that this effects a saving of approximately



Older type of front-entrance, center-exit car loading and unloading

3.6 cents per car-mile in the cost of platform labor and fixed charges on rolling stock.

It is to be borne in mind that reduction in number of stops will to some extent decrease the number of short-distance rides.

It is probable that delays due to street traffic may be materially reduced in some cases by the rerouting of cars so as to use those thoroughfares where street traffic congestion is less. Notable results have been accomplished recently along these lines in Kansas City, where a very marked increase in schedule speed has been effected.

During the past winter, the making of good schedule speeds in Cleveland was seriously interfered with by vehicular traffic on the car tracks. After several of the heaviest snowstorms the city authorities were totally unable to clear even the main thoroughfares of snow. The railway company, however, did succeed in keeping its lines open and the space between its tracks continually cleared.

The result of this was that practically all vehicular traffic took to the car tracks, thereby delaying schedules. As was natural, blame for these delays was placed by the public upon the railway company. It is worth consideration that every effort be made to promote co-operation between city authorities and electric railway companies to the end that main thoroughfares throughout their entire width be cleared of snow. It is right and proper that every pressure be brought to bear upon city authorities to clean streets more expeditiously after snowstorms.

Train of new type in action, at Public Square, Cleveland

LOOPS HELP IN THE CONGESTED DISTRICTS

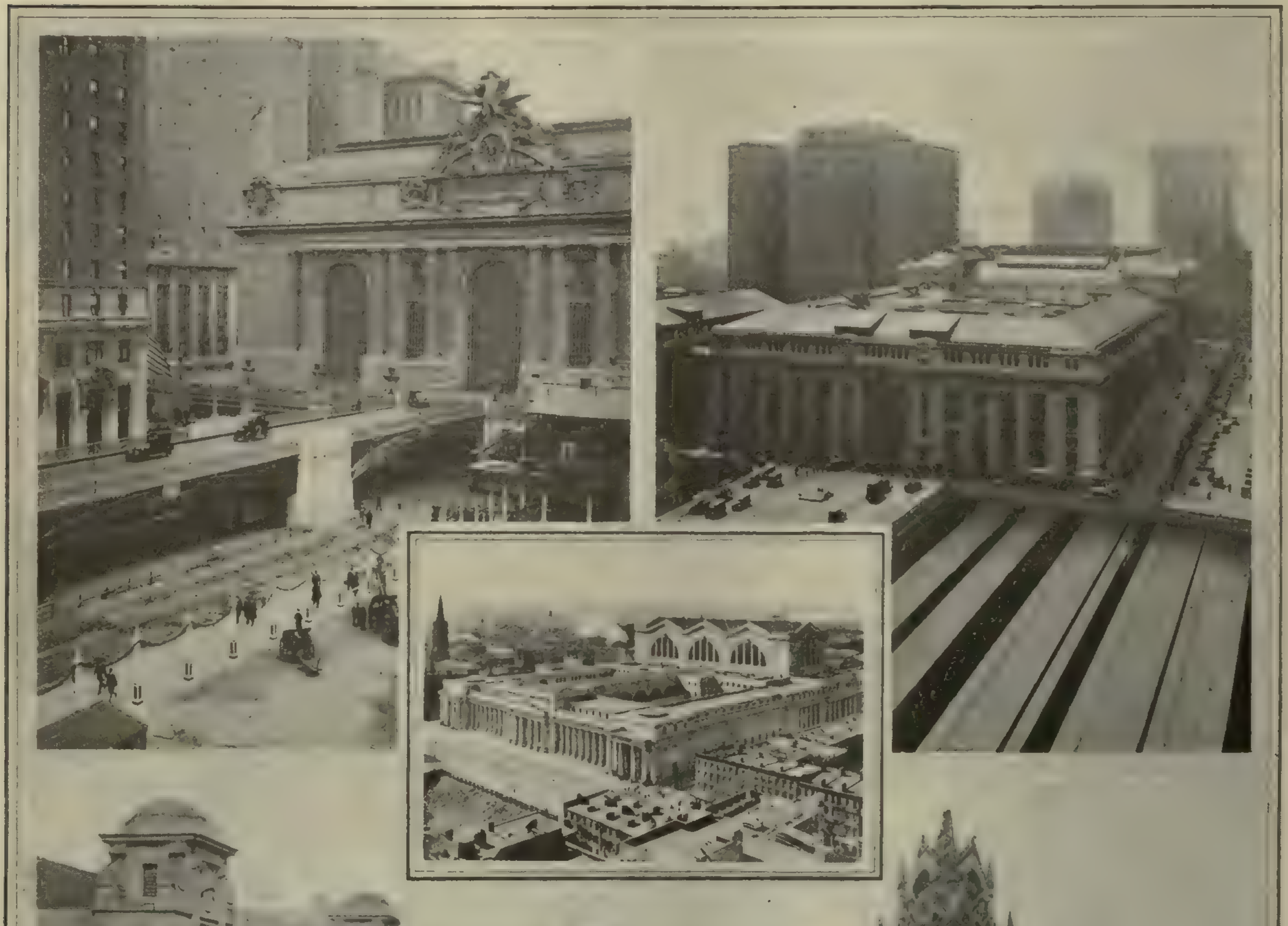
The Cleveland Railway has used with great success a system of loops in its downtown congested district. These loops are so arranged on the Public Square that there is no interference between cars of different lines. All cars coming into the Public Square by way of Euclid Avenue use a single loop. This loop is not used even in part by the cars which enter the square by any other street than Euclid Avenue. The same thing holds true of all the other streets leading into the Public Square. This system has been effective not merely in elminating delays due to interference between cars of different lines but also by greatly facilitating the loading of cars. Congestion in the downtown section of Cleveland has also been mitigated to some considerable extent by the looping back of cars at the edges of this district, and in this way the reduction of the number of cars actually entering the congested district has been achieved.

INCREASED POWER DUE TO INCREASED SCHEDULE SPEEDS NOT IMPORTANT

Nothing has been said in the foregoing with reference to the increased power required to increase acceleration and attain higher maximum speeds. The writer has no precise data with which to calculate these additional power requirements. It has been found that cars operated during the rush hour on somewhat slower schedule speeds use slightly less power than do these cars during the base schedule. This difference, however, is quite small. The cost of energy per car-mile is relatively a small part of the total cost of operation, not more than 7 or 8 per cent. For this reason it may be considered that additional power requirements for higher schedule speeds are practically negligible so far as cost is concerned.

The ELECTRIC RAILWAY JOURNAL has recently collected by means of a questionnaire considerable data on the subject of train operation from a large number of representative street railways throughout the country. The figures brought out by a compilation of this data, as given on page 658, are interesting. The schedule speed of trains during the rush hour in sixteen cities varies, the minimum being 8.40 m.p.h. and the maximum 10.28 m.p.h. So far as the effect of the use of trailers upon schedule speed is concerned, it is probable that the above figures indicate very little, inasmuch as traffic conditions in the streets during the rush hour are much more of a limiting factor than is the use of trailer cars.

Four great railroad terminals handling congested suburban traffic



Top—Grand Central Terminal, New York Central Railroad, New York City. At left—The south façade showing the viaduct, located in the center of Park Avenue and crossing over Forty-second Street, by means of which street traffic is shunted around the station away from the narrow adjacent streets. At right—A general view of Grand Central Terminal from the north. In center—Bird's-eye view of the Pennsylvania Railroad Station, New York City, the New York terminal of the Long Island Railroad. This view was taken from the Seventh Avenue side before the erection of the Pennsylvania Hotel, which would now occupy the foreground of picture. Bottom, at left—Front of Chicago & Northwestern Railway Station, Chicago, Ill. At right—Broad Street Station, Pennsylvania Railroad, in Philadelphia.

Experience and practice of Long Island Railroad are covered in detail and data for other roads which are handling dense suburban traffic are given

Handling Suburban Traffic at Congested Centers

By C. Francis Harding

Head of School of Electrical Engineering, Purdue University

Suburban train, Philadelphia-Paoli electrification, Pennsylvania Railroad

THE rapid growth in population of the large cities of this country during the past few years has imposed difficult problems upon the railways which serve the communities around these centers. The methods developed for transporting large numbers of people within restricted periods of time are therefore appropriate subjects for consideration in this special issue devoted to "mass transportation."

In order to render the topic as tangible as possible the Long Island Railroad, which serves a considerable part of New York's suburban population, has been made the basis of the main part of this study. This road was one of the pioneers in electrification and its business is largely made up of suburban passenger traffic. Table I is reproduced to illustrate the characteristic features of the Long Island's traffic by comparison with three other roads which also have large suburban business. In addition data have been compiled as to the situation on the Pennsylvania's Philadelphia terminal, the New York Central's New York terminal, the Illinois Central's and Chicago & Northwestern's Chicago terminals and the New Haven's Boston and New York terminals.

Conditions in and Around New York

Taking up first the New York region in general and the Long Island's territory in particular, it is safe to say that new homes, which are both comfortable and convenient, have been made available for 1,000,000 residents of New York as a result of the well-planned development of the electric railroads in that vicinity. Fifteen years ago the New York business man was obliged to travel the length of Manhattan Island in order to reach his home in reasonable time. The rapid-transit system in use and proposed at that time provided little opportunity for the resident of Brooklyn or Queens to get to his office promptly and in comfort. Yet in spite of this fact there were to be found within twenty minutes' ride of Wall Street some of the most attractive residential districts that any city could desire. The "airplane" view on page 669 indicates very clearly the undeveloped possibilities of this section.

Progressive railway officials, generously provided with imagination and foresight, have built up during the intervening period a most extensive network of electrified high-speed railroads. These have resulted in enormously increased passenger and freight traffic, and indirectly have developed very greatly the residential and industrial possibilities of the entire district immediately east of the business center of New York City.

The argument, often presented with less concrete evidence for its support, that passenger and freight traffic and finally increased population follow the development of adequate, rapid and comfortable railway service is forcefully emphasized in the case of the Long Island Railroad in the Borough of Queens in particular.

The number of passengers carried by the Long Island Railroad has increased during the past fifteen years from 18,199,000 to 64,067,000 per annum, a ratio of 353 per cent. Of this present passenger traffic, which rep-

TABLE I

Traffic Data for Four Roads for 1919
Reproduced to Illustrate Characteristics of Long Island Railroad's Traffic*

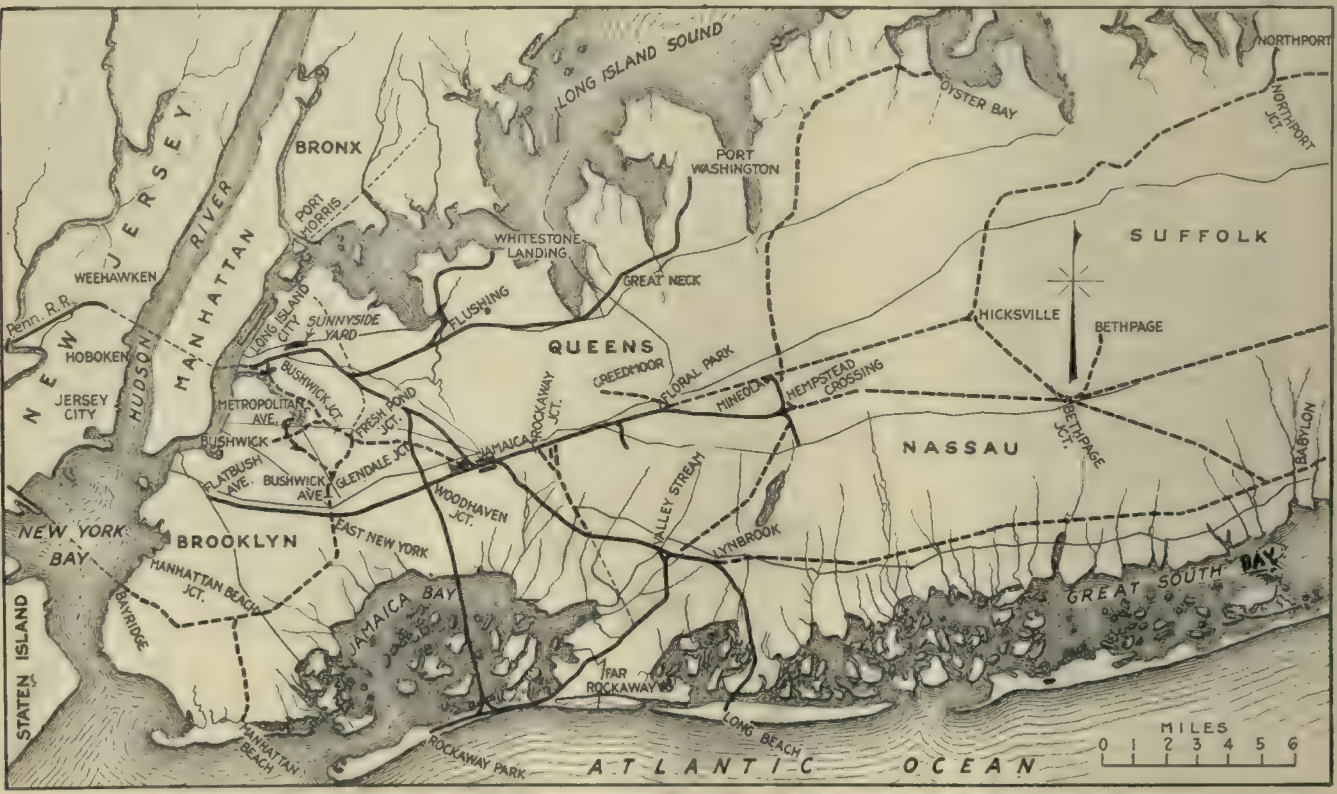
	Long Island R.R.	N.Y., N.H. & Hartford R.R.	N. Y. Central R.R.	Illinois Central R.R.
Mileage operated	398.38	1,965.76	6,040	4,793.22
Train mileage:				
Freight train-miles	410,035	5,896,941	25,870,044	15,169,784
Passenger train-miles	6,061,233	14,153,385	32,656,740	13,613,502
Mixed train-miles	6,886	79,604	277,746	218,764
Special train-miles	24,060	8,344	14,569	45,508
Freight traffic:				
Revenue freight moved (tons)	5,912,833	27,873,747	99,208,314	38,245,714
Revenue freight one mile (tons)	127,868,238	3,169,098,542	21,567,568,497	9,994,435,480
Revenue tons one mile per mile of road	320,971	1,586,451	3,568,798	2,085,119
Average haul per ton (miles)	21.63	111.44	217	261.32
Average revenue train load (tons)	295.26	504.39	824	649.47
Average rate per ton per mile (cents)	4.915	1.557	0.87	0.715
Freight earnings per revenue train-mile	$14.772	$8.01	$7.20	$4.645
Passenger traffic:				
Passengers carried	64,067,541	100,938,578	67,594,465	31,002,734
Passengers carried one mile	1,022,941,429	2,023,988,204	3,376,508,355	946,075,908
Passengers one mile per mile of road	2,567,753	1,063,678	615,014	197,378
Average distance per passenger (miles)	15.97	20.05	49.95	30.52
Average rate per passenger per mile (cents)	1.526	2.212	2.527	2.529
Passenger earnings per revenue train-mile	$2.575	$3.64	$3 23	$1.730

*Compiled by Poor's Publishing Company.

resents 70 per cent of the total business of this railroad, 367,057 passengers are riding on monthly commutation tickets. As a parallel to this, freight tonnage has increased since 1905 at a corresponding rate, as indicated in Fig. 1.

During the last decade, however, the population of the Borough of Queens, directly east of the business center of New York, has increased 64.5 per cent, while that of Manhattan itself has actually decreased, as indicated by the last census. The combined population of Brooklyn and Queens, after an increase of 30 per cent, is now approximately 2,500,000, which is in excess of that of Manhattan. Chicago, Detroit and Philadelphia only, of all the cities of the country, exceeded the Borough of Queens during the year 1919 in plans and cost estimates filed for new buildings and additions. Of the $46,000,000 proposed for building construction in this borough during the year, more than 60 per cent is to be expended for homes. The diagram reproduced in Fig. 1 indicates in a very striking manner the relation between growth of population and passenger and freight business in the district affected.

This railroad had the honor of being one of the first steam railroads in the United States, having been incorporated in April, 1834. The original railroad was constructed from the village of Greenport, L. I., to the



Electrified and steam zones on the Long Island Railroad. Solid lines show electrified track; dotted heavy lines, steam-operated railway

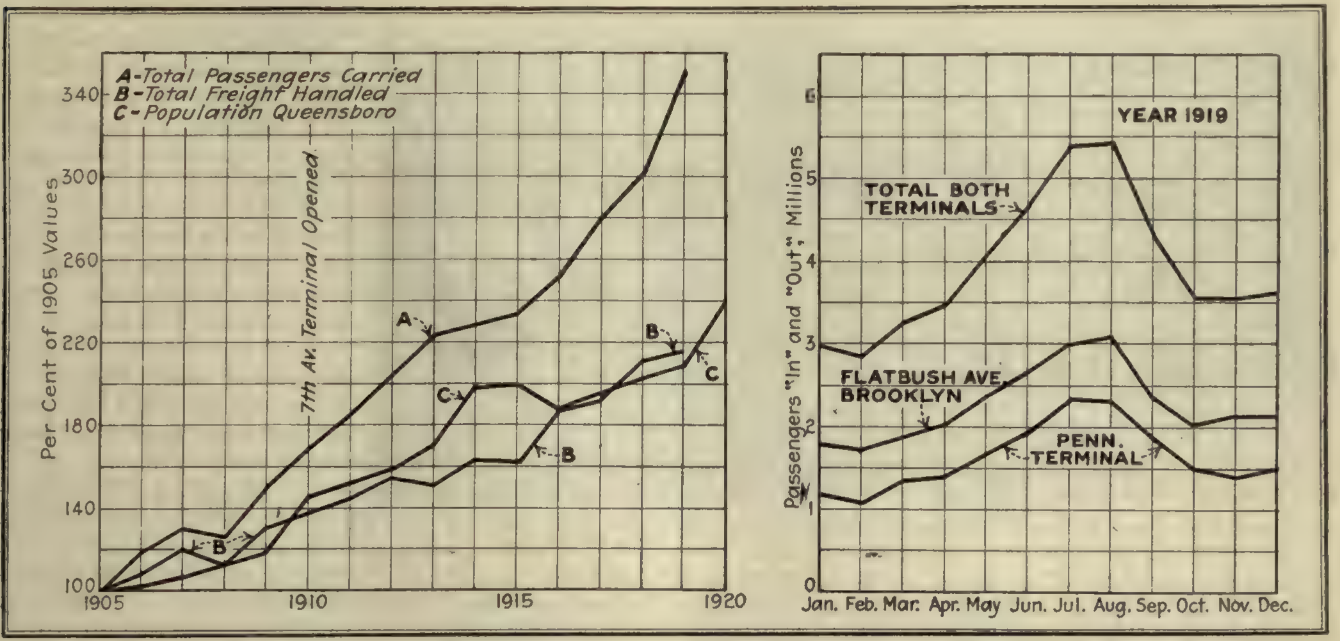


Fig 1—Increased population usually results from adequate passenger service. Fig. 2—Passengers "in" and "out" of terminals, Long Island Railroad, 1919

water's edge in the village of Brooklyn in order to connect with the steamboats at the former town. Thus a through line of transportation was established from New York to Boston. Long Island City and Jamaica, always important business centers upon Long Island, were connected in 1860, while Far Rockaway Beach was included in the system as early as 1873.

Control of the Long Island Railroad, greatly enlarged but still operated entirely by steam, was purchased by the Pennsylvania Railroad in 1901, and the road was electrically equipped at the time of the electrification of the Pennsylvania's New York terminal.

Aside from the vast residential and industrial areas in close proximity to a great city which are tapped by this system, enormous freight and passenger car storage yards, so necessary at the waterfront terminus of a transcontinental system, were provided thereby. The famous Sunnyside Yard at Long Island City, indicated upon the accompanying map, which comprises 190 acres, has a capacity of 2,000 cars with 73 miles of track. A loop, possibly of greater value for freight than passenger service, will be noted extending from Long Island City through Fresh Pond, East New York and Manhattan Beach Junction to the Bay Ridge

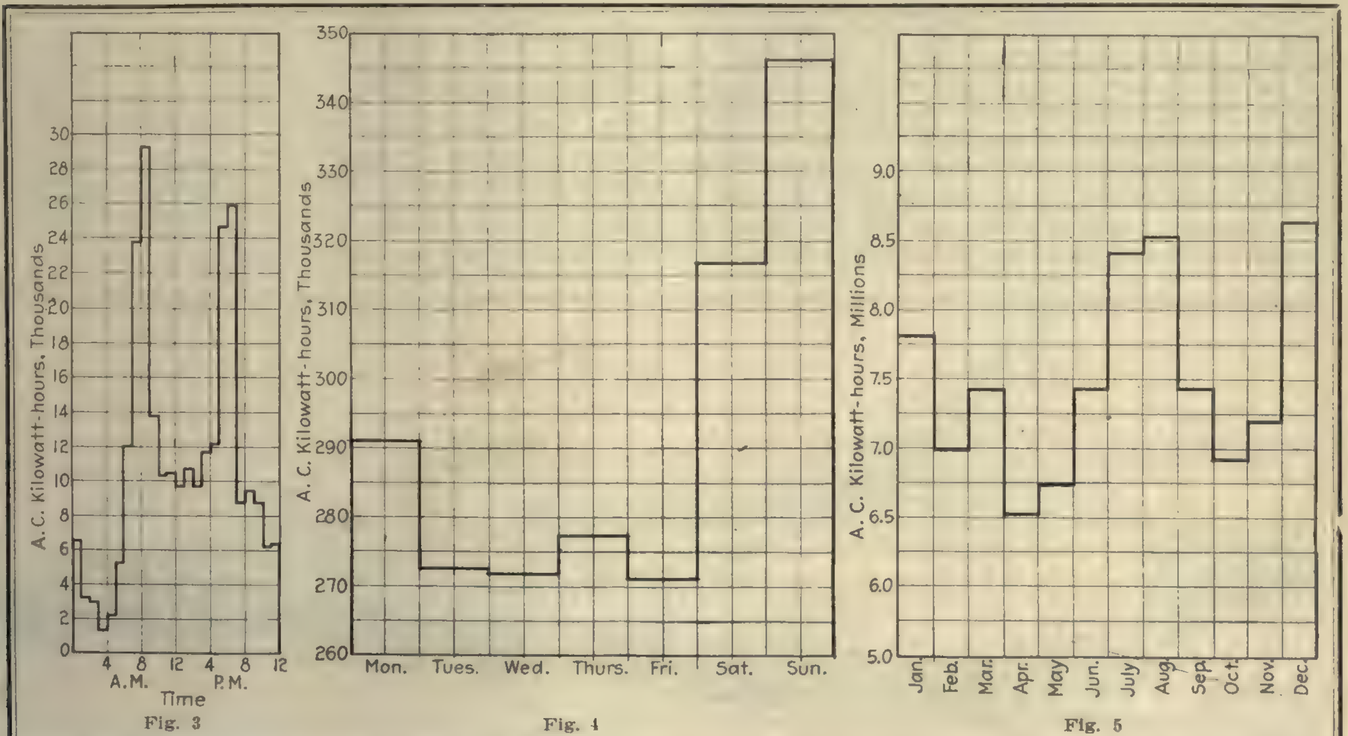
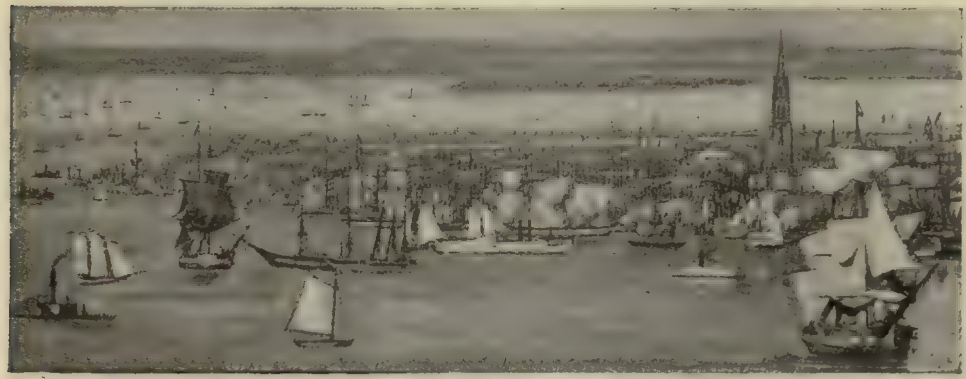


Fig. 3

Fig. 4

Fig. 5

Energy Demands on Long Island Railroad. Fig. 3—Typical hourly load, summer schedule, July 15, 1920. Fig. 4—Typical daily load, summer schedule, year 1920. Fig. 5—Monthly load, year 1919



The Battery in 1855

wharves, from which point the Pennsylvania Railroad ferry makes connection with the New Jersey docks. Furthermore, the tracks of the Long Island Railroad connect with all the important points of access to "Nature's great playground," as Long Island has often been called. Four hundred miles of shore line on ocean, sound and bays, not to mention the many fresh-water lakes on the island, attract thousands of summer resort tourists. On Sunday, July 4, this year, the road exceeded all previous records, when it transported 20,000 passengers to Rockaway Beach from New York City, 15,000 from Brooklyn and 25,000 from East New York and other points on the Atlantic division. Thus a total of 60,000 pleasure-seeking passengers were successfully handled to one beach only with a prearranged schedule upon a single day.

EARLY RESULTS OF ELECTRIFICATION

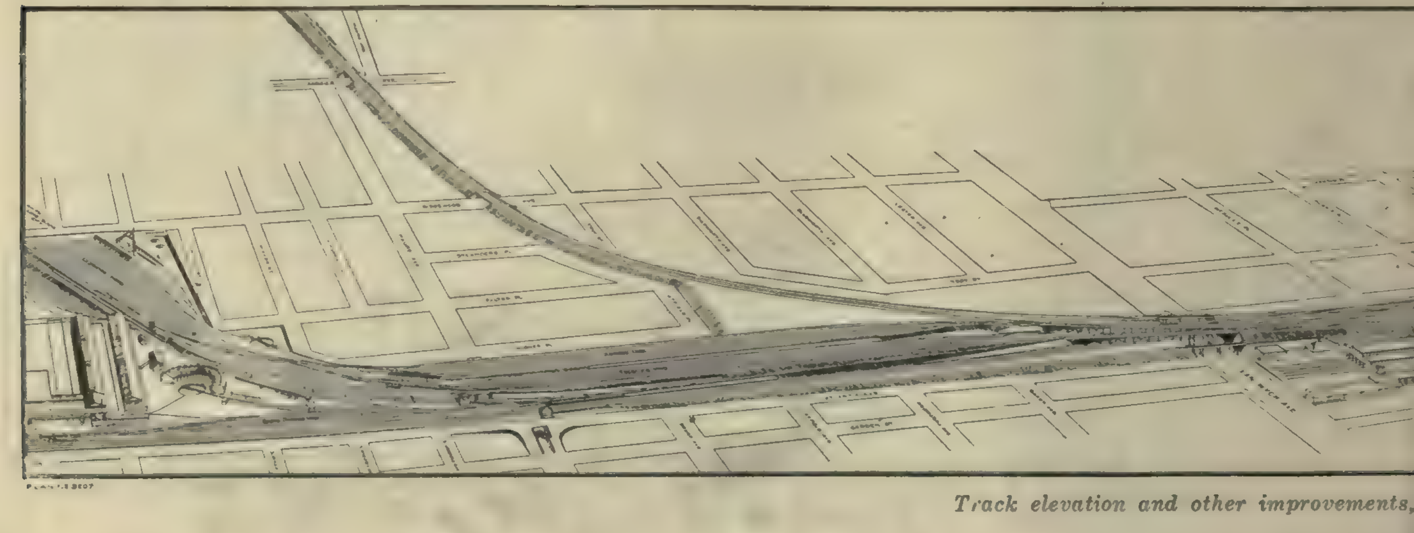
Soon after the acquisition by the Pennsylvania Railroad, the Long Island Railroad found it desirable to improve its connections between Queens and Brooklyn. This development between the Jamaica and Flatbush terminals involved a great deal of grade crossing elimination and tunnel construction, which led primarily to the first electrification, inaugurated July 26, 1905. The successful and economical results of such operation over 70 miles of track brought about the change to electricity, between 1905 and 1910, of practically all the lines within a radius of 25 miles of New York City. The cost of this operation was found to be sufficiently below that of steam practice to pay fixed charges and provide a surplus in addition. Figures quoted by George Gibbs, chief engineer of the Pennsylvania Terminal & Tunnel Company, in the ELECTRIC RAILWAY JOURNAL, March 28, 1910, page 534, indicated a reduction in cost as compared with steam operation from 27.95 cents to 17.8 cents per car-mile. This saving was 1.94 cents per car-mile greater than that obtained upon the West Jersey & Seashore Railroad, probably because of the difference in type of traffic handled by the two roads. The cars used at that time were small ones of the subway type operated from a third-rail supply at 600 volts, direct current, to make them interchangeable with those of the Manhattan subway. As early as 1901 plans were being laid for an electrified terminal in Manhattan for the Pennsylvania and Long Island. The following, quoted from the official plans, in the *Street Railway Journal*, Dec. 21, 1901, is significant:

> After years of exhaustive study the conclusion has been reached that a terminal line, operated by electricity, is in every way the most practical, economical, and the best, both for the interests of the railroad company and of the city . . . As the railroad will be wholly underground and operated electrically . . . it will not be objectionable in any way. There will not be any smoke, dirt or noise, and as all the surface property may be built upon after being utilized underneath for railroad purposes the neighborhood of the station will be improved instead of marred, as is often the case when railroad lines are constructed on the surface or elevated.

TABLE II

Passengers Carried In and Out of Terminals, Long Island Railroad

	Pennsylvania Station	Flatbush Avenue, Brooklyn	Total on Road
1910	1,417,903 (4 mos.)	13,455,991	30,978,615
1911	6,219,859	14,094,003	33,867,228
1912	7,732,184	15,772,402	37,319,812
1913	9,629,026	17,501,524	40,606,183
1914	11,031,845	18,064,729	41,634,223
1915	11,807,512	18,135,150	42,629,325
1916	13,224,258	19,666,344	45,802,722
1917	14,459,259	23,118,805	50,796,028
1918	15,595,142	23,824,123	55,004,086
1919	19,843,245	27,544,000	64,067,541



Track elevation and other improvements,

The Battery in 1920

Steel, multiple-unit trains were, as a result of this decision, operated through tunnels under the East River to the Pennsylvania Station on Sept. 8, 1910.

During the first ten months of such operation an increase of 92 per cent in the number of passengers carried on the Long Island Railroad was experienced, while the corresponding figure on the Pennsylvania Railroad was 31 per cent. The growth since that time is clearly indicated in Table II. The variation in traffic during the successive months of 1919 is plotted in Fig. 2. An inspection of these graphs will show, in a striking manner, the peak load encountered during the summer upon this railroad due to the heavy traffic to the summer resorts on Long Island.

Passenger receipts on the former road were found to be 160 per cent greater after electrification. In 1911, according to George Gibbs*, the operation of 8,600,000 car-miles over 152 miles of electrified track of the Long Island Railroad was accomplished at a cost of 24.2 cents per car-mile, including depreciation. A car-mileage of double that previously maintained was found to be possible, with decreased failures. The train-mileage between failures had been tripled during this period as a result of electrical operation. Where electric locomotives were used the cost of their operation per mile was, at that time, 5.91 cents, as compared with 8.83 cents for steam locomotives on the New Jersey division and 11.9 cents on the entire Pennsylvania system.

TRANSFER PROBLEMS SOLVED

The next problem to be confronted in planning the transportation of large masses of people into and out of this large city terminal was that of a central transfer point for distribution over Long Island. Sixteen trains per day, carrying a relatively small group of through passengers for Montauk and other eastern sections of the island where the road has not been electrified, are transferred from electric to steam locomotives at Long Island City soon after they leave the river tunnels. This is not, however, the logical center of distribution for the bulk of the traffic leaving the Pennsylvania Terminal for Long Island. Jamaica, which has been for a long time the hub of the island, was naturally selected for such a transfer station. Most of the passengers from New York City, therefore, change cars at this station.

The concentration of so much traffic upon the tracks centering in this locality, in which the grade crossings had not been abolished, brought up the problem of track elevation and the erection of a rather elaborate transfer station as early as 1903. This has been particularly well worked out in accordance with the perspective drawing reproduced herewith. The Jamaica station, shown in the cut on page 670, as operated since March, 1912, is remarkably well adapted to the severe service to which it is subjected. Three through tracks in each direction are provided, with concrete platforms at the level of the car floor. Two tracks with separate platforms take care of the local traffic. In addition, one run-around track is provided in each direction for the through non-stop passenger and freight trains. Certain tracks are very definitely assigned to regular routes and permanently marked with signs which prove a great convenience to the traveling public in locating the train desired. A number of guide signs in-

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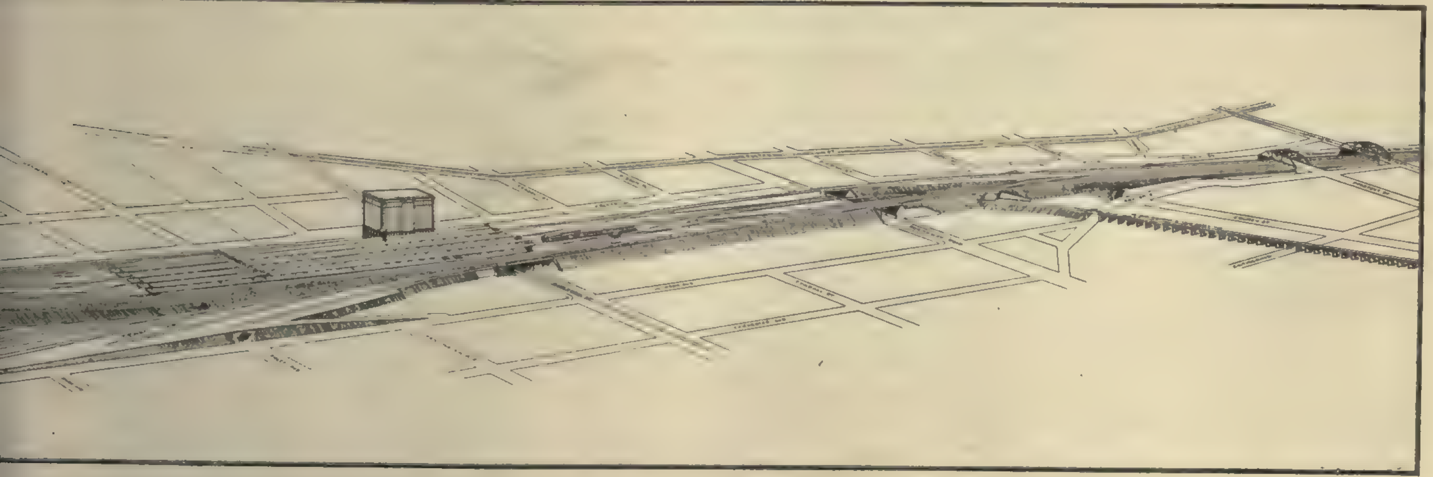
*ELECTRIC RAILWAY JOURNAL, March 23, 1912, page 463.



Long Island Railroad, Jamaica, N. Y.

dicate the destination of each particular train are displayed by station attendants previous to the departure of the train. As a result of the careful location of platforms between trains involving the transfer of many passengers, and the detailed direction signs provided, thousands of such transfers are readily made each day with no difficulty.

Forty-one west-bound trains, averaging seven cars each, pass through this station daily during the period between 8 and 9 a.m. Personal observation on the Fourth of July by a disinterested passenger, who had occasion to make several transfers at this point, proved conclusively that adequate provision had been made for the comfortable and prompt handling of very large crowds. Upon this particular week-end, including the holiday, all previous records of passenger transportation were exceeded, with a total number of 1,569,800 passengers handled.

TABLE III

Holiday Traffic on Long Island Railroad

	1915	1916	1917	1918	1919	1920
Passenger-train movements	5,015	5,361	4,897	4,857	5,179	5,470
Passenger-car movements	24,773	27,321	24,094	26,519	30,674	31,054
Baggage-car movements	1,369	1,508	1,382	1,342	1,481	1,353
Freight and work-train movements	374	411	356	368	382	392
Freight-car movements	7,939	8,986	8,124	8,386	7,821	8,651
Passengers carried	917,917	1,029,721	1,023,265	1,121,560	1,433,600	1,569,800
Carloads of express and baggage	780	1,077	977	874	894	916

Table III sets forth some interesting figures for five-day holiday week-end periods for this and previous years.

Although these crowds have been successfully handled thus far by using every available car and by carefully planning the extra schedules in advance, the margin of cars available for inspection and repair is too small for conservative operation. The Long Island Railroad operates 394.56 miles of road, of which 85.69 is electrified. The total track mileage is 964.48, of which approximately 220 miles of track is operated by electricity. A total of only 558 multiple-unit cars are available at present for this service, of which 424 are large motor cars, Type-M-P-54; ninety-one are trailers, and 134 are of the small M-P-41 type, used in the Brooklyn service, which are not interchangeable with the trailers. The regular morning-hour rush requires 406 large and 122 small cars, leaving margins of but 4½ and 9 per cent respectively for inspection and repair. It is estimated that the railroad is at least 150 cars short in its electrified zone. Of these, seventy are on order, with promise of possible delivery this fall. An adequate supply of cars cannot be provided until additional funds are available.

TRAIN SCHEDULES MAINTAINED WITH GOOD RECORDS

All trains are operated in accordance with a predetermined semi-annual printed time schedule. This is prepared to meet the traffic demands as nearly as possible as a result of a study made of the performance of similar periods during past years, combined with the growth of traffic during the years in question. Changes are made usually about the middle of May and October. Additional trains are necessary during the summer months to handle the excess traffic of that season. This excess is evident from Fig. 2. With the schedule once established, the variations in daily and hourly loads are provided for by the operation of more or fewer cars per train.

In order to take care of the extraordinarily heavy beach travel on Sundays during the summer months, the Sunday time-table is changed about the last week in June. The revised schedule continues in effect until the first or second Sunday following Labor Day, with the provision, of course, for many additional trains.

Tables IV to VI show the various runs and operating conditions upon the electrified section of the Long Island Railroad.

The number of employees assigned to a train is based primarily upon standard railroad practice, but owing to the short hauls and numerous stops upon this system additional collectors are necessarily added to the regular crews in accordance with the number of cars in the train. This varies on different divisions of the road and is somewhat affected by the class of travel handled. These extra trainmen work regularly on certain trains and have regular runs assigned to them.

TABLE IV

Typical Runs—Electric Service, Long Island Railroad

Terminals of Run		Express or Local	Length of Run, Miles	Number of Stops	Average Distance Between Stops, Miles	Running Time, Minutes	Schedule Speed, Miles per Hour
Pennsylvania Station	Port Washington	Local	19.9	15	1.33	49	22.4
Pennsylvania Station	Port Washington	Express	19.9	7	2.85	39	30.6
Pennsylvania Station	Whitestone Landing	Local	13.3	9	1.48	31	25.8
Pennsylvania Station	Jamaica	Express	11.3	1	11.3	17	39.9
Pennsylvania Station	Long Beach	Express	24.6	1	24.6	36	41.0
Pennsylvania Station	Long Beach	Local	24.6	15	1.64	52	28.4
Pennsylvania Station via Ozone Park	Valley Stream	Express	25.8	10	2.58	50	31.0
Pennsylvania Station	Rockaway Park	Local	19.2	10	1.92	42	27.4
Flatbush Avenue	Hempstead	Express	20.0	8	2.50	42	28.6
Flatbush Avenue	Rockaway Park	Local	15.9	15	1.06	41	23.3
Flatbush Avenue via Ozone Park	Valley Stream	Express	22.5	13	1.73	50	27.0
Flatbush Avenue	Jamaica	Express	9.3	3	3.10	17	32.8
Flatbush Avenue	Queens	Local	13.2	16	0.83	39	20.3

The nature of the hours of employment on the Long Island Railroad is governed entirely by the agreements with the various brotherhoods generally in effect upon standard railroads. It is often difficult to plan an effective employees' schedule in accordance with such agreements which will at the same time meet the demands of morning and evening peak loads of traffic. The trainmen are paid upon a combined hourly and mileage basis. This involves either a 140 or a 100-mile run in a standard eight-hour day as a basis for ten hours' normal pay. In many cases this work must be made up of two four-hour shifts, one in the morning and the other during the evening rush period.

ELECTRIFICATION OF TERMINALS MAKES ITSELF FELT IN IMPROVED SERVICE

It is difficult to draw any comparison between electric and steam operation, so far as the numbers of employees or employee-hours are concerned. When the electric service was first inaugurated upon the Long Island Railroad the schedule speed of trains was materially increased and the time required for setting trains and departing from the terminals was considerably decreased. Since that date many suburban stops have been added and more trains operated in proportion to the traffic demands in order to give better service. Thus the advantages of electric traction show themselves in improved service rather than in a reduction of train-hours or employee-hours. It would be quite impossible, however, to operate present schedules in and out of the terminals with steam traction.

Courtesy of Wm. D. Bloodgood & Co., Inc., Real Estate, Long Island City

"Airplane" view of Long Island, looking east from Manhattan

At the Flatbush Avenue terminal of the Long Island Railroad in Brooklyn twenty-six trains per hour are handled during the rush period upon six tracks. Contrast this procedure with steam traffic at the Long Island City terminal fifteen years ago, when difficulty was experienced in taking care of from fifteen to twenty trains per hour on sixteen tracks.

In the Pennsylvania Station, New York, the Long Island Railroad uses regularly six or seven tracks for departing trains and has the use of any and all tracks for incoming trains. Occasionally during the rush hours one or two tracks of the Pennsylvania Railroad are used in addition. Yet with this limited number of tracks, between 8.01 and 9 a.m. thirty-two west-bound trains were scheduled to arrive and ten east-bound trains to leave. Between 5.02 and 6.01 p.m. twenty-seven east-bound trains leave and nine west-bound trains arrive.

It is interesting to compare this with conditions at the London terminal of the Great Eastern Railroad, which probably handles the largest number of steam trains in a stub-end terminal. There forty trains per hour have been operated with six tracks. This system, however, has a provision for shunting the steam locomotives around the stub-end terminal tracks, thus greatly increasing the number of locomotive-hours available for active duty.

Disinterested inspection of the trains on the Fourth of July by a representative of the ELECTRIC RAILWAY JOURNAL indicated that very few passengers were standing in the cars in spite of the tremendous crowds that were traveling. Extra ticket booths, placed in the waiting rooms for the sale of tickets to the beaches, where traffic was particularly heavy, in addition to the twelve ticket windows, making twenty-one positions in all, had been established to relieve the congestion and keep the passengers in a favorable state of mind. Such little points as these have their marked psychological effect upon the riding public and yet involve little additional cost and trouble.

Cars on this road are inspected every ten days. The mileage basis of inspection has been discarded in favor of the time method. At present forty-nine cars per day are being handled by the two inspection shops. This process of repair and maintenance was described in detail in the ELECTRIC RAILWAY JOURNAL, June 5, 1920, page 1136. In addition, inspectors are employed between 1 and 9 a.m. at the various yards, where cars are stored for the night. This procedure takes care of minor repairs, such as brakeshoe changes, adjustments, etc. Groups of cars, numbering from thirty-five to eighty-five, are available for such inspection at five different yards located at various points upon the system.

POWER CONSUMPTION AND OPERATING COSTS

Considerable improvement has been made lately by the Long Island Railroad in energy consumption in regular operation. Table VII indicates the fact that whereas the electric motor car-mileage increased in 1919 over 1918 by a margin of 9 per cent and the steam car-mileage by 3.2 per cent, yet the make-up of trains has been so carefully planned that the trailer car-mileage has advanced 137 per cent. This improved operation, without detriment to schedules, is reflected in the energy consumption, which, it will be seen, has been reduced from 87.4 to 83.4 watt-hours per ton-mile at the third rail. A portion of the extra energy consumption in 1918 must, however, be attributed to the very severe weather conditions encountered during the winter of that year.

The cost of energy set forth in this table naturally shows an increase due to rise in fuel and labor costs, although the maintenance charges have been held remarkably close to the figures established in 1918. The cost increases are reasonable in view of the general increases which have occurred.

Transfer station and office building at Jamaica, L. I.

TRAIN DISPATCHING METHODS

Practically all trains in the electrified zone are operated without train orders unless unforeseen difficulties or delays arise. In such cases the train crews are instructed by telephone from the dispatcher's office at Jamaica. Telephone outlets are available to trainmen every 2,000 ft. throughout the electrified zone. Trains, in cases of trouble, are then detoured by the dispatcher, either upon an extra track or in another direction around one of the many available loops upon the system. Passengers waiting at stations from which trains are likely to be delayed indefinitely are notified of such delay in order that they may make other plans if desired. Such announcements are always appreciated by the patrons of the road, who would prefer to know the facts promptly rather than be kept in ignorance of the possibilities of reaching their destination.

The most densely operated sections of the road are equipped with automatic block signals, while the other portions of the road are operated under the "absolute manual block" rules.

At terminals records must be filled out by the conductor of the departing train, giving details of time, train make-up, etc., while upon arrival at its destination a more complete report is required, giving the causes of delays, if any, the number of passengers carried, etc. These are filed in the dispatcher's office.

Train orders, not affecting the rights of a superior train, may be given orally over the telephone and confirmed by both conductor and motorman of the train involved. Superior orders, subordinating the rights of trains otherwise having right-of-way, must bear the personal signatures of both conductor and motorman as an extra precaution against any possible misunderstanding.

Train dispatchers upon the Long Island Railroad recognize the impossibility of handling the traffic into such a terminal as that of New York City by means of steam locomotives. Upon being asked the question, "Is operation by means of steam locomotives possible?" the chief dispatcher answered, "Certainly not! What would you do with the locomotives when you got them in there? The switching of trains in and out of the station with steam locomotives under such short headway and with the limited track capacity is out of the question."

TABLE V

Train-Miles per Route-Mile—Steam and Electric Operation, Long Island Railroad

	Passenger Train-Miles		Route-Miles		Passenger Train-Miles per Route-Mile	
Year	Steam	Electric	Steam	Electric	Steam	Electric
1910	3,129,862	1,855,972	374.0	54.8	8,369	33,868
1911	2,936,184	2,553,219	363.1	64.7	8,086	39,462
1912	2,812,853	2,552,525	360.8	66.0	7,797	38,675
1913	2,272,809	2,845,878	354.0	74.1	6,420	38,406
1914	2,181,539	3,276,387	343.2	87.2	6,356	38,720
1915	2,102.766	3,202,617	341.2	90.3	6,104	35,466
1916	2,199,080	3,155,538	341.2	90.3	6,445	34,945
1917	2,291,552	3.435,192	341.2	90.3	6,716	38,042
1918	2,509,660	3,305,852	341.2	90.3	7,355	36,610
1919	2,544,043	3,576,097	341.2	90.3	7,456	39,602

TABLE VI

Car-Miles per Route-Mile—Steam and Electric Operation, Long Island Railroad

	Car-Miles		Route-Miles		Car-Miles Per Route-Mile	
Year	Steam	Electric	Steam	Electric	Steam	Electric
1907	14,441,861	3,830,911	378.5	38.0	38,175	100,200
1908	13,071,445	4,945,719	372.4	42.0	35,105	117,720
1909	13,535,123	5,754,436	371.4	44.8	36,460	128,350
1910	13,945,133	7,134,366	374.0	54.8	37.282	130,200
1911	13,534,626	9,497,738	363.1	64.7	37,260	146,730
1912	12,991,882	10,624,172	360.8	66.0	36,040	161.000
1913	12,302,872	12,039,426	354.0	74.1	34,770	162.750
1914	11,062,474	13,783,793	343.2	87.2	32,230	158,100
1915	10,957,699	13,832,618	341.2	90.3	32,110	153.200
1916	11,653,425	14.875.807	341.2	90.3	34.160	164.700
1917	13,036,476	15,507,970	341.2	90.3	38,200	171.800
1918	13.905,068	15,679,570	341.2	90.3	40,750	173,600
1919	14.353,592	18,059,377	341.2	90.3	42,050	200,000

New Haven train on New York Central track near New York City

New Haven train under 11,000-volt contact line on its own right-of-way

It should be remembered also, in considering the test of "mass transportation" upon the Long Island Railroad, that this road was called upon during the war to handle the soldiers of fourteen divisions located at Camps Mills and Upton, Long Island. Six thousand special trains involving 61,247 cars were required to transport more than 3,000,000 troops during the period from July, 1917, to October, 1919. This was in addition to more than 1,000,000 passengers and furloughed soldiers who traveled to and from the camps as individuals. During the heaviest month of this traffic 307,000 soldiers were transported to and from the camps and embarkation docks in 476 special trains. This was followed by the record-breaking landing in France in August, 1918.

By summarizing the density of passenger traffic of

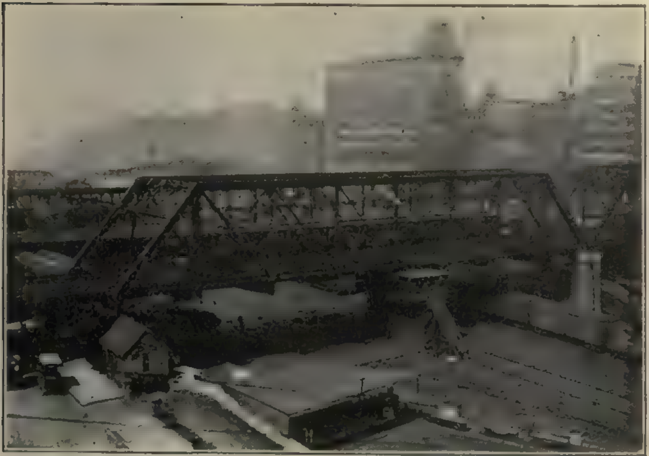
TABLE VII

Operating Data and Costs, Long Island Railroad

	1918	1919
Car-miles—motor*	14,920,207	16,266,607
Car-miles—trailer*	759,363	1,792,770
Car-miles—steam	13,905,068	14,353,592
Train-miles—electric*	3,333,390	3,496,958
Train-miles—steam	2,528,863	2,494,043
Car-miles permile of track—electric	6,958	8,010
Average cars per train—electric	4.71	5.17
Average cars per train—steam	5.50	5.76
Kilowatt-hours per car-mile at power house	....	5.17
Kilowatt-hours per train-mile at power house	....	25.72
Kilowatt-hours per car-mile delivered to third rail	....	4.15
Kilowatt-hours per train-mile delivered to third rail	....	21.46
Watt-hours per ton-mile at power house	108.8	103.3
Watt-hours per ton-mile delivered to third rail	87.4	83.2

	1918	1919
Watt-hours per ton-mile at power house—summer months, no heater load	92.0	91.3
Cost of power per car-mile at power house	$0.0604	$0.0624
Cost of power per train-mile at power house	.2990	.3228
Cost of maintenance of transmission line per car-mile	.0047	.0053
Cost of maintenance of transmission line per train-mile	.0221	.0274
Cost of maintenance and operation of substations per car-mile	.0121	.0110
Cost of maintenance of substations per train-mile	.0570	.0458
Cost of maintenance of third-rail and track bonding per car-mile	.0071	.0070
Cost of maintenance of third-rail and track bonding per train-mile	.0330	.0362
Cost of power at car shoes per car-mile	.0843	.0857
Cost of power at car shoes per train-mile	.3971	.4431

* Includes traffic over P. R.R. tracks between Sunnyside Yard and Pennsylvania Station, N. Y., amounting to about 10 per cent.



Chicago elevated railway crossing Northwestern tracks

Looking east from Jamaica station, Long Island Railroad

TABLE VIII

Transmission and Distribution System Construction, Long Island Railroad

Electrified track, miles	225.65
Transmission line (longest distance), miles	26
Number of substations (permanent)	15
Number of substations (portable)	3
Substation rated capacity, kw	56,000
Power station rated capacity, kw	67,000
Length of pole lines, miles	75.24
Chestnut poles in line	2,353
Creosoted poles in line	565
Steel poles in line	393
Underground conduit system, miles	12.5
Underground conduit system, duct-miles	435.23
Underground cable system, miles	46.4
Signal circuit, miles	50.05
Number of lightning-arrester houses	9

TABLE IX

Passengers Carried per Mile on Three Representative Railroads in 1919

West Jersey & Seashore Railroad	1,091,807
New York, New Haven & Hartford Railroad	1,019,641
Long Island Railroad	2,570,205

three representative electrified steam roads of the East, as in Table IX, it is evident that conditions on the Long Island Railroad represent the application of electric traction to the densest traffic which is encountered on any of the electrified zones of trunk lines in the country.

The commutation traffic on the Long Island Railroad is particularly heavy as compared with through passenger or freight service. In 1905 the number of passengers who purchased and used regular monthly commutation tickets was 76,644 upon the entire system. Last year this figure had increased to 367,057, representing an increase of 380 per cent. Although this commutation traffic aggregated last year about 47 per cent of the total passengers carried 1 mile, the revenue from that 47 per cent was less than 24 per cent of the total revenue. This indicates the expensive nature of such traffic. To state it differently, the average return from this commutation traffic was three-quarters of 1 cent per mile. This reduces the return from the average passenger upon this road to 1.53 cents per mile, while the other roads of the United States averaged about 2.65 cents per mile and the bulk of the steam railroad traffic paid 3 cents per mile.

Although the numbers of commuters have greatly increased over last year, the gross earnings of the company for June, 1920, showed a falling off of $75,000, as compared with the same month of last year (due to the troop business handled in 1919), while the operating expenses showed an increase of over $200,000. The cost of doing business is so high that, with the present rate structure, the more passengers that are handled the greater is the financial loss. The problem therefore is necessarily one of asking the passenger, particularly the commuter, to pay the actual cost of good service rather than attempting to reduce the quality of service to approximate the income.

THE SUBURBAN SITUATION ON OTHER ROADS

The Long Island Railroad suburban business has been treated in detail in this article because the road's traffic is so largely a suburban proposition. Data have, however, been secured from several other railroads whose suburban business is considerable. These data vary in character on account of the different operating conditions and methods of record keeping, hence cannot be combined in a general table.

New York Central Railroad.—The number of commutation passengers carried by the New York Central in 1919 was 20,707,352, an increase of 3,030,533, or 17.6 per cent, over 1918, and 4,446,347, or 25 per cent, over 1917; the increase in 1918 over 1917 being, therefore, 1,415,814, or 12 per cent. These figures indicate actual rides by commuting passengers and are many times the number of tickets sold.

About 75 per cent of the commutation service of this road is out of New York City, other commuting

TABLE X

Commutation and School Tickets Between New York City and Selected Stations on Hudson Division, New York Central Railroad, April, 1918, 1919, 1920

Station	Miles from New York	Mileage of Sixty Trips	Monthly Tickets Sold April, 1918†	Monthly Tickets Sold April, 1919†	Monthly Tickets Sold April, 1920†	Old Monthly Commutation Rates	New Monthly Commut'n Rates	Rates per Mile Under New Schedule	Increase in Fare per Trip Cents*
125th Street	4.2	252	...	...	...	$3.36	$4.03	1.59	1.1
University Heights	8.7	522	138	129	125	5.34	6.41	1.22	1.7
Spuyten Duyvil	10.4	624	32	47	60	6.16	7.39	1.82	2.05
Ludlow	13.7	822	309	366	662	7.15	8.58	1.04	2.88
Yonkers	14.5	870	448	638	1,353	7.43	8.92	1.02	2.48
Glenwood	15.6	936	298	336	589	7.65	9.18	0.98	0.55
Hastings-on-Hudson	18.8	1,128	240	297	412	8.31	9.97	0.88	2.77
Dobbs Ferry	20.0	1,200	190	219	286	8.47	10.16	0.84	2.82
Irvington	22.0	1,320	145	190	216	8.75	10.50	0.79	2.92
Tarrytown	24.5	1,470	653	700	979	9.08	10.90	0.74	3.03
Ossining	30.2	1,812	417	578	805	10.12	12.14	0.66	3.37
Croton-on-Hudson	33.9	2,084	114	125	186	10.56	12.67	0.62	3.51
Peekskill	40.6	2,436	237	317	447	12.16	14.59	0.59	4.05
Beacon	58.3	3,498	52	67	83	15.90	19.08	0.54	5.3
Newburgh	58.3	3,498	25	14	21	15.90	19.08	0.54	5.3
Poughkeepsie	72.8	4,367	54	73	123	18.59	22.31	0.51	6.19

* Increase based on sixty trips per month.

† Number of passengers carried may be greater than number of tickets sold as figures include family commutation tickets good for any member of purchaser's family.

cities on the system being Buffalo, Cleveland and Chicago.

Under the new schedule of rates, 20 per cent above those prevailing until recently, the average rate per mile which will be paid by commuters in the New York City district will be 0.8 cent per mile. The average commutation ticket will cost $11.57. The previous respective figures were 0.675 cent and $9.60. The commutation rate per mile varies according to distance, ranging from 0.5 cent for the maximum distance of 72 miles to Poughkeepsie to 1.59 cents for the 4-mile ride to 125th Street, New York City.

Table X shows details of the commuting business in April, 1918, 1919 and 1920 out of New York for a few typical stations on the Hudson Division, selected from among the total of thirty-eight.

Pennsylvania Railroad—Philadelphia Electrification.—This electrification consists of the Paoli and Chestnut Hill lines, and the purpose of undertaking the present electrification and of extending it later to other suburban lines is primarily to secure increased capacity in Broad Street Station and yard, which were badly congested under steam operation.

Careful analysis by a special operating committee of the movements under steam operation through the more important routes leading from the station to the main running tracks and yards lead to the conclusion that an increased capacity of from 20 to 25 per cent could be secured by this electrification. The improvements in operation under electric traction are such as to lead the operating people to believe that the estimates were substantially correct. The train service, of course, has changed materially under the new method of operation and a marked growth in traffic has been experienced.

The keeping of records during war years under government operation was curtailed and no data by years are available. The following figures for the year 1919 with comparative notes regarding previous steam conditions are, however, available:

1. The number of miles of main line electrified tracks is 106.1 and, including yards, the total mileage is 117.28.

2. The number of trains handled in both directions during the evening maximum traffic hour for both lines is fifteen and the corresponding number of cars is about eighty-four.

3. The average number of cars per train throughout the year is about four and the maximum number in rush hours in the heavy-travel direction is eight.

4. The number of trains per day operated at present is regularly 149. In certain seasons additional trains are run and, of course, the number of cars per train is varied from time to time. Comparisons with previous steam operation are not of any great value.

TABLE XI

Time-table of Running Time and Scheduled Speed, P. R.R., Philadelphia Electrification

	Broad Street to Paoli		Broad Street to Chestnut Hill	
	Steam	Electric	Steam	Electric
Running time, local trains, min.	57*	50	49	33
Schedule speed, m.p.h.	21	24	24½	21.8
Per cent increase over steam	..	14	16⅔	6

* Steam trains could not maintain schedule by two to five minutes.

5. The running time and schedule speed as given in time-tables at which these trains operate is shown in Table XI.

6. The car-miles operated for the first and second years of full electric operation were: For the year ended April 1, 1919, 2,538,524 and for 1920, 3,020,000, an increase of 18.9 per cent.

7. The year 1919 shows an increase of 17 per cent in passenger receipts over 1918. Electric operation was inaugurated on the Paoli line in 1915 and on the Chestnut Hill line early in 1918.

New Haven Railroad.—The route mileage in the Boston suburban zone of the New York, New Haven & Hartford Railroad is fifty-four. In addition the New Haven has a considerable commuting traffic out of the Grand Central Terminal (the New Haven uses the New York Central Terminal for part of its New York suburban traffic). Out of Grand Central the following numbers of New Haven passengers were handled in the respective years mentioned: 1916, 14,412,974; 1917, 12,445,338; 1918, 12,201,891; 1919, 14,285,883.

Table XII shows the business at the Boston terminal for five years past and gives information as to the terminal itself.

Illinois Central Railroad.—A heavy suburban traffic is handled by the Illinois Central Railroad at its Chicago terminal. Table XIII contains full information as to this suburban traffic and the facilities available therefor. This terminal is now operated by steam, but early electrification is contemplated.

Chicago & North Western Railway.—Another railroad which does a large suburban business out of Chicago, employing steam motive power, is the "North Western." For the year ended Dec. 31, 1919, this road handled 13,540,417 passengers on its Wisconsin division, including 8,671,437 on the Milwaukee line and 3,622,014 on the Harvard line. On the Galena division 3,622,014 were carried, a total of 17,162,431 passengers. The passenger revenues were: Milwaukee line, $1,860,895; Harvard line, $713,610, and Galena division, $613,231; total, $3,187,736. Table XIV gives

TABLE XII

New Haven Railroad's Terminal Traffic at Boston, 1915-1919

	1915	1916	1917	1918	1919
Number of passengers handled into and out of terminal	26,182,177	27,769,416	29,612,351	29,281,270	34,233,541
Average number of trains per day in and out of terminal—summer	504	505	444	434	472
Average number of trains per day in and out of terminal—winter	479	478	419	408	457

Maximum number of trains during the five-year period in and out during one day	690
Number of terminal tracks	28
Approximate area of terminal, acres	31
Miles of road in suburban zone	55.45

data as to the number of trains required for this business. In this case the week-end travel is lighter than the regular daily traffic.

TABLE XIV

Trains In and Out of Chicago Terminal, North Western Railway, 1919

	Through In	Through Out	Through Total	Suburban In	Suburban Out	Suburban Total	Grand Total
Monday to Friday, inclusive	39	42	81	118	112	230	311
Saturday	39	42	81	115	112	227	308
Sunday	32	28	60	45	49	94	154

SUBURBAN TRAFFIC AND ELECTRIFICATION

The data of terminal traffic of steam roads which have been given in this article show the part which electrification is playing in helping solve the suburban transportation problem. Obviously the Long Island Railroad could not handle its terminal traffic by steam even if steam locomotives were permitted to enter New York City through the East River tunnels. In Philadelphia the terminal capacity was greatly increased by electrification and the Illinois Central will enjoy similar results when its present plans are carried out.

In Boston the New York, New Haven & Hartford Railroad, which is still operated by steam, has handled a steadily increasing suburban traffic during the past five years which now represents over 130 per cent of that in 1915. The increase of fare upon the Boston Elevated Railroad was no doubt the cause of a portion of this growth in traffic. During this period, however, the average number of trains handled in and out of the South Station has been reduced by 6.5 per cent as a result of limited equipment. This extra traffic, necessarily carried with reduced equipment, resulted in standing loads with little if any increased operating cost. It was a typical case of enforced impairment of quality of service rather than the provision for adequate service at increased rates. It is quite probable that the new rates will cause some of the patronage to revert to the electric lines and more or less automatically adjust the abnormal condition. Electrification, if immediately available, would have solved the problem.

Park Avenue approach to Grand Central Terminal, New York, from south

There is no question but that present conditions in all of the large city terminals are more favorable than ever before to electrification. Rapidly increasing density of traffic, limited track and equipment facilities, greatly increased costs of fuel and labor and the demands for prompt and efficient suburban service to sections of the community where living conditions are tolerable point to electric operation. It is not necessary to emphasize further the well-proven arguments for electrification, of lower operating costs, increased value of real estate located over terminals, power conservation, elimination of smoke, shorter headway possible due to rapid acceleration, etc. The advantages, both economic and esthetic, are obvious and therefore generally conceded. The problem then is to secure the necessary funds to take care of the first cost.

In conclusion, a few words regarding the power end of terminal electrification may be in order.

Although marked savings have been effected in the operating methods and efficiency of electrified railroads, rising costs have more than absorbed these. For example, when the New York Central Railroad was electrified energy was produced with 2.85 lb. of steam per kilowatt-hour. Economies practiced in the generation of this energy have now reduced this figure to 2.2 or 2.3 lb. per kilowatt-hour. At that time, however, coal was purchased at $1.99 per ton. Now this road is paying $7.20 per ton for fuel. In those days stoker operators could be called upon to keep the equipment in repair during periods of light load. Now, as they demand machinists' rates for this work, a separate staff of mechanics must be maintained for the purpose and the time of the stokers is used to less advantage.

TABLE XIII

Chicago Suburban Traffic of Illinois Central Railroad, 1915-1919

	Year Ended June 30 1915	Year Ended June 30 1916	Year Ended Dec. 31 1917	Year Ended Dec. 31 1918	Year Ended Dec. 31 1919
Total passengers carried for year	12,681,298	13,699,341	13,815,447	12,818,552	15,257,398
Miles of track in suburban zone	82.32	82.32	82.32	82.32	82.82
Passenger train-miles	1,300,957	1,323,835	1,419,635	1,419,635	1,417,938
Average miles per passenger	8.00	8.04	8.18	8.26	8.23
Average cars per train	4.5	4.4	4.4	4.2	4.3
Number of terminal tracks	6	6	6	6	6
Area of suburban terminal yards—car capacity	279	279	279	279	279
Average time required to set train and remove locomotive, minutes	2	2	2	2	2
Total suburban employees engaged in suburban zone	490	506	509	519	481
Train employees in suburban zone	242	258	261	265	258
Number of trains per day in and out terminal:					
Average, weekday	288	294	308	312	306
Maximum, weekday	298	302	315	326	320
Sunday	132	132	134	138	134

Steam trunk lines have formed physical connections with the underground roads so as to permit through travel without change

Relieving London's Congestion

By a Correspondent

London, England

Main line of the Great Western at Ealing, Western London suburbs, showing train on District Station siding, a Central London underground train and a long distance express train

IN A RECENT review of the present state of traffic in London, Lord Ashfield, the chairman of the underground group of passenger transit agencies, stated that the difficulties with which his organization had to contend would be relieved in a large measure by the development of the policy of linking up the underground lines with the suburban lines of the trunk railroads. Lord Ashfield, American electric railway officials will recall, was formerly, as A. H. Stanley, the general manager of the Public Service Railway of New Jersey. Some account of recent developments in the undertakings that he now controls in the British metropolis should prove of interest to readers of this paper.

Present State of Passenger Transit in London

Railway extension in London and the normal development of existing facilities were, of course, held up by the war, and consequently a great deal requires to be accomplished to bring the urban railroads into line with the increased demands now being made upon them. One of the chief difficulties is the congestion of traffic that occurs at certain hours of the day, a difficulty induced primarily through the altered conditions of labor, the general adoption of the eight-hour day being responsible, as in American cities, for overwhelming volumes of traffic having to be dealt with during short periods of the morning and the evening. A contributory cause is the development of the central area of London as a commercial center, the demolition of extensive parcels of residential property, and the erection on their site of large blocks of business premises taking place rapidly and continuously. This latter factor in itself constantly adds to the number of passengers journeying to and from the central area, and the burden placed upon the urban railroads will become even heavier during the next two or three years when the many new housing schemes scheduled for various parts of the outer suburbs will have materialized.

Briefly, the London railroads have not only to make up the leeway lost during the five years of the war but have to cope at the same time with an inordinate increase of traffic arising through the changes brought about by the war. The problem is further complicated by the fact that the British railroads generally are sustaining heavy deficits in operation, with the result that the investing public is chary of providing the additional capital that is essential for new construction and other much-needed improvements.

The question of passenger traffic in London has twice been the subject of special inquiries by Parliamentary commissions, once in 1903 and again so recently as 1919. Both commissions reported very strongly in favor of a traffic board being set up as a supreme authority in all matters relating to passenger transit in Greater London. The duties of the traffic board would be to co-ordinate the operations of the various transport agencies and to regulate and direct all of them as a single entity. Up to the present, however, this recommendation—the adoption of which should help in the betterment of traveling facilities in the English capital—has been accorded no practical consideration by the government. Co-ordination, it is true, exists among certain groups of undertakings—such as those controlled by Lord Ashfield—that are under a single direction, but generally competition for traffic is rife. This means that each transit agency or group of agencies is influenced in its activities by a keen regard for its own immediate interests, instead of one and all working together on harmonious lines to deal with the problem in the best interests of the traveling public.

There are nine trunk railroads operating lines in London and its suburbs; two groups of underground railways, one of which—that directed by Lord Ashfield—controls the motor bus concerns and also two of the more important suburban street railways; the London County Council, which operates the street railways within the county area, and various small street railway undertakings which are operated by the municipal authorities in the outer suburbs.

At and near Harrow station, North Western Trunk Railway. Eight miles from tunnel zone, the Underground's tracks run by the side of tracks for long distance steam traffic

Notwithstanding certain increases that have been made in fares, all the foregoing traffic agencies are at present being operated at a loss. Wages, materials and the other items of operating expenses have risen to an enormous extent, and even with the further increases of fares that are contemplated it is questionable whether the London traffic agencies will be able to extricate themselves from their present difficulties. The street railways in particular are in bad plight. None of the privately owned concerns pays its way or has done so for some few years past, while the County Council undertaking is faced with a deficit on the current year of operation equivalent to a rate of sixpence on the pound.

Such, then, are the conditions prevailing in London today—conditions that aggravate the difficulties which confront the passenger transport enterprises.

The project of making physical connections between the underground lines and the suburban lines of the trunk railroads serving the British capital was inaugurated some forty years ago by the District Railway, the parent line of the group of transport agencies with which Lord Ashfield is associated. In its early days of steam operation the District extended its lines into the western suburbs and made physical connections at two separate points with the suburban lines of the London & South Western Railway, an important trunk railroad with extensive branches in the metropolis. Through these connections the District trains were enabled to run direct from the City (the term city in relation to London is applied only to the square mile or so—the heart of the modern metropolis—that constituted the London of the Middle Ages), to certain towns of the outer area. It also permitted trains of three steam railways to run through to the City over the District Railway tracks.

Whe the District system was electrified in 1905, however, the steam-hauled "foreign" trains were withdrawn in nearly every case, and at the present time these lines in the Central London area are scarcely capable of accommodating the traffic worked over them by the District company alone. One or two "foreign" services are still worked over the District track, being hauled on this section of their journey by electric locomotives.

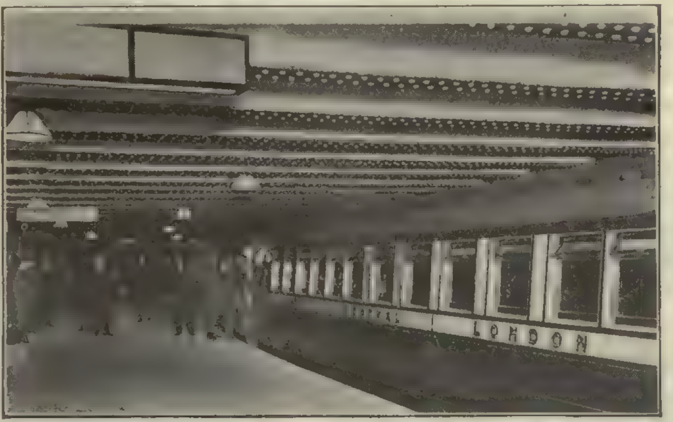
As an illustration of the facilities accruing from physical connections between the underground and the trunk railroads it may be mentioned that the Midland Railway, with which the District lines connect at their eastern extremity, operates trains from Southend (situated on the Thames estuary) to Ealing, a distance of about 50 miles, the last 10 miles or so being over the District track in the London area. When the District was electrified, the various sections of the "foreign" lines over which the District trains ran were electrified also, so that the through-running facilities that had been brought about by the physical connections were preserved.

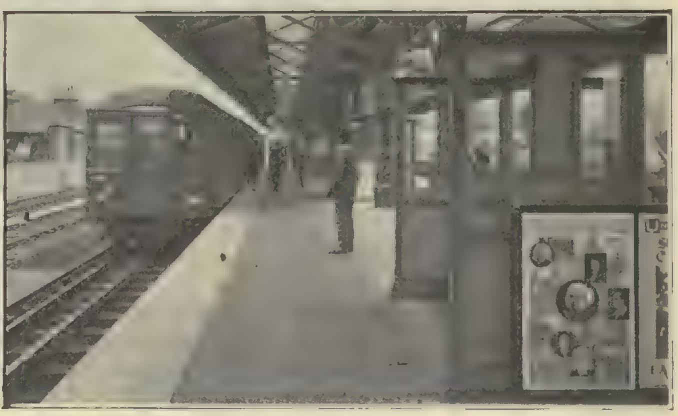
Here it may be as well to point out that the original underground railways of London—the Metropolitan and the District—are of the "cut and cover" type and consequently similar in general type to the subways of New York. The tunnel sections are sufficiently large to permit the passage of rolling stock of standard dimensions. On the other hand, the underground railways of later origin are in deep-level tunnels bored out by the Greathead shield system. These tunnels—or tubes, as they are popularly called—are of relatively small diameter, 11 ft. 8½ in., increasing to 12 ft. 6 in. at the curves, and can therefore accommodate rolling stock of corresponding proportions only.

SOME RECENT PHYSICAL CONNECTIONS

The first physical connection between a deep-level underground line and a trunk railway was opened in 1917, in which year the trains of the Bakerloo section of the Underground began running over the North Western Company's track to Watford.

From the time taht it was opened for traffic in 1905 the Bakerloo has been extended on three occasions in a northwesterly direction, the third extension bringing the line up to the surface and effecting the physical junction with the trunk railway above mentioned. From the Bakerloo terminus at the Elephant and Castle in southeast London to the Watford Station of the North Western company is a distance of nearly 21 miles. The Bakerloo line itself is but 6 miles in length; this physical connection with the North Western Railway has therefore more than trebled the extent of route served by the Bakerloo trains. Between the Elephant and Castle terminus of the Bakerloo line in southeast London and Watford, which is in Hertfordshire, a fifteen minutes' service is maintained in each direction, the journey being accomplished in an hour, exceedingly good speed when it is borne in mind that the Bakerloo trains halt *en route* at twenty-two stations during the run, eleven belonging to the Bakerloo Railway and eleven to the North Western. Building operations follow the railway, and this and other long-distance extensions of the Underground into rural territory will play an important part in the expansion of London, opening up as they do new areas suitable for development on both residential and industrial lines.





At left, Central Underground train in newly developed residential suburb. Above, same train in tunnel station. At right, District Underground train on South Western Trunk Railway line

The linking up of the Bakerloo with the North Western Railway was the first physical connection of the kind that has taken place since Lord Ashfield assumed the direction of the London Underground Railways. It was one of several such schemes that had been projected prior to the war, but the majority of them are now held up indefinitely through the unsettled outlook in railroad operation and the greatly increased cost of carrying them out. One such scheme of connection, however, had progressed so far prior to the war that its completion after the cessation of hostilities was not retarded by the foregoing considerations. This was the extension of the services of the Central London section of the Underground to Ealing, to which, in view of the many features of interest that are presented, we propose to devote a special notice.

Although it was not actually the first deep-level electric line constructed in London (the City & South London Railway, opened in 1890, has this distinction), the Central London Railway may be regarded as the prototype of the latter-day underground railway.

Opened for tarffic in 1900, the Central London Railway, through the introduction of various features that were modeled upon American railroad practice, marked a new departure in urban transit in the British metropolis and determined in a large measure the form and policy to be adopted by deep-level railway undertakings opened subsequently. One interesting innovation was the uniform fare of twopence charged for any distance, an essentially American idea and one that proved exceedingly popular in London while it prevailed. This uniform fare was abandoned in 1907.

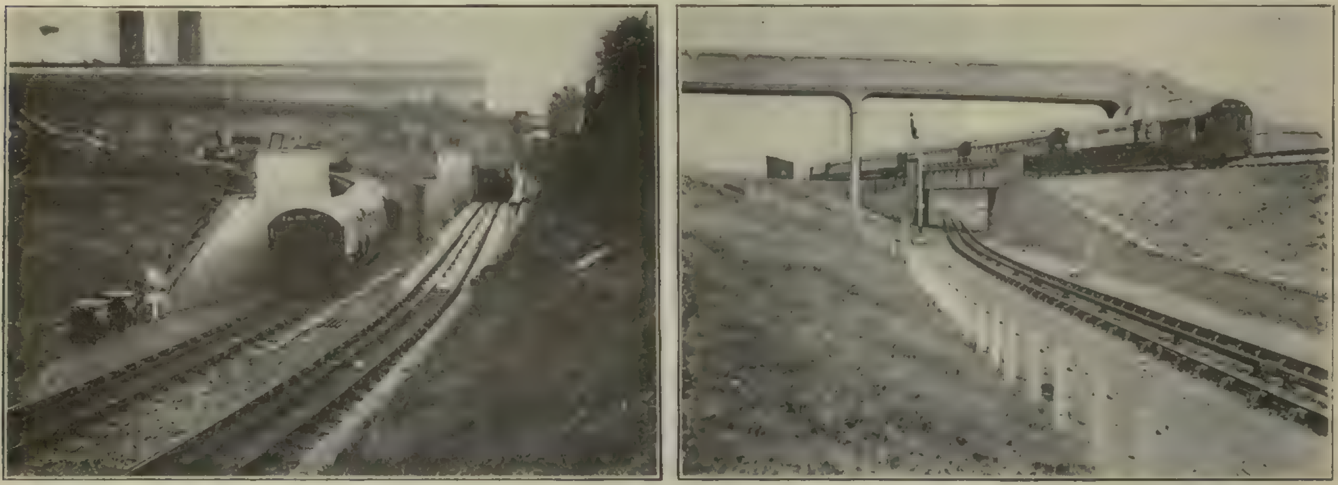
The Central London cars, which were the first in England of the American vestibule pattern, were hauled originally by locomotives, a method of traction that caused considerable vibration to the houses above the tunnels. This trouble was overcome by superseding locomotive traction by the multiple-unit system, an improvement which had also the further advantage of speeding up the trains. The drawbacks of locomotive haulage experienced on the Central London Railway led to the general adoption of the multiple-unit system of traction on the District Railway, as well as on all four of the new deep-level electric railways that were opened for traffic a year or two later, without these lines having first to "buy" their experience as the Central Railway had done.

Contiguous throughout its length to one of the two western trunk highways leading out of London, the Central London Railway affords a very good illustration of Euclid's definition of a straight line, as it takes the shortest route between its City terminal at Liverpool Street and its original western terminal at Shepherd's Bush, a distance of about 6 miles. At the latter point the line ended on the threshold of a patch of rural territory very sparsely populated but presenting good scope for development, assuming that it was traversed by a railway providing direct connection with the central area of London. The first development in the district in question was the laying out of the Shepherd's Bush Exhibition, which was opened in 1908 and will doubtless be recalled by many readers of this paper through its being the venue of the Olympic Games of that year. A short extension brought the Central London Railway right to the main entrance gates of the exhibition, where a new station, called Wood Lane, was erected. This extension carried the line, which was only a few feet below ground at Shepherd's Bush, up to the surface.

Four miles west of Wood Lane was an important station, Ealing, on the main line of the Great Western Railway, the chief trunk railroad serving the western counties of England, and with its London terminal, Paddington, situated outside the central area. The construction of a line linking up the Central London Railway with the Great Western was an obvious necessity in the interests of both undertakings. First projected in 1905, the work of construction was begun by the Great Western Company some few years later and had made such progress prior to the war that it was practicable to work special goods freights over the line during the period of hostilities. After the war work of electrification proceeded apace, and on Aug. 3, 1920, the Central London trains began working direct from the City to Ealing. The second physical connection of the Underground with a main-line railway had become an accomplished fact. Meanwhile, the development of the district served by the new line had been very rapid, from both an industrial and a housing point of view, with the result that besides the interchange facilities afforded to passengers using the Great Western and Central London lines the Underground trains have a new field of traffic opened up to them. Another good result is the relief of the congestion of traffic on the District line of the Underground to Ealing, this line, hitherto the only direct route between Ealing and the City, running to Ealing by a somewhat circuitous course south of the Central London line.

Unlike the other lines of the Underground, which are constructed on the four-rail principle, or with one rail for a return, the Central London Railway has the three-rail principle, with central positive conductor-rail and running-rail return, a system that has been adhered to on the extension. The construction work of the extension reflects in many respects the latest ideas in railroad engineering, one especially interesting feature being the signaling installation, which is of the Mackenzie-Holland three-position, all electric type, and is the longest stretch of this design that has thus far been installed on any British railroad. All the signals are worked in the upper quadrant and are controlled by alternating current track circuits, the following indications being given: Horizontal (red light)—danger; forty-five degrees (yellow light)—proceed with caution; vertical (green light)—proceed at normal speed. The signals are put to "danger" on the passing of a train and do not change position until the train has cleared the track circuit of the section ahead, when the signal arm works automatically to the 45-deg. position, assuming the vertical on the train clearing the second section. For foggy weather repeating-light signals are provided throughout the new line at a distance of 200 yd. from the signals. These are lighted when necessary by means of switches. On the underground system generally the two-position type of signaling in is force; the operation of the new installation on the Ealing extension is therefore being regarded with considerable interest.

Among other schemes of improvement that are now perforce in abeyance on the Underground in London are physical connection between the (1) Central London



At left, Central London Underground train emerging from tunnel at Wood Lane. At right, the physical connection between the Central London Underground and the Great Western Trunk Railroad line and the South Western Railway; (2) the Piccadilly line of the Underground and the District and South Western lines to Hounslow and Richmond, and (3) another between two Underground lines, the Hampstead and the City & South London.

A deep-level Underground station, King's Cross on the Piccadilly line

The first-mentioned scheme entails the construction of only a short connecting line at Shepherd's Bush, where the tracks of the two railways concerned are within a quarter of a mile of each other. This extension would enable the Central London trains to work through direct to Richmond, Twickenham and other Thames Valley towns and would form a very considerable addition to the mileage of route served by that railway.

The present western terminal of the Piccadilly line is at Hammersmith, where this line shares a station with the District Railway. A physical connection between the two lines would mean the linking up of the southwestern suburbs of London with those in the north, where the other Piccadilly line terminal is situated.

The third scheme of physical connection—that between the Hampstead and City & South London lines of the Underground—would enable through trains to be worked direct between south London and north London and would greatly improve the existing means of communication between these districts. This project involves the enlargement of a considerable portion of the tunnels of the City & South London Railway. This line, as has already been stated, was opened so long ago as 1890, and the tunnels of the section then constructed have a diameter of only 10 ft. 2 in. which debars the use of the modern type of Underground rolling stock. One of the initial improvements needed to bring the City & South London Railway into line with the present requirements of traffic is the provision of the standard type of car in place of the primitive pattern at present in use. Hence the necessity to enlarge the tunnels, an undertaking of a very protracted nature, seeing that the work has to be done segment by segment and can be carried out only at night during the short intervals between the close and commencement of traffic.

While it is manifest that the policy of linking up the underground physically with the surface railways must affect a material improvement in the facilities for travel in London, it is also obvious that this improvement will in itself tend in the future to make general on the system a difficulty that is at present in evidence on one section only—the District. The whole of the underground railways of London are alike in having two sets of running rail only, a limitation that is bound to affect adversely the smooth working of more than the one service of trains for which each line was originally intended. The convergence of two or more services onto the sections of the Underground system in the central area of the metropolis will, if the passenger traffic of London maintains its existing rate of increase, lead in time to congestion on these sections during the busy hours. The frequency with which trains can be worked through to the terminals on the branch lines is circumscribed by the train-running capacity of the line from which they diverge.

The bottle-neck of the District Railway between the eastern and western bifurcations of its lines at Mansion House and South Kensington respectively is already taxed to its utmost capacity during the peak hours of traffic. As many as forty-three trains in each direction—eighty-six in all—are worked in the hour over this section. This is train-working extraordinary—perhaps a world's record. Nevertheless, the present requirements of traffic on this railway demand greater capacity. This might be supplied by a third track, although the cost of such an improvement now would be very great. Other possibilities are cars with greater capacities, better facilities for loading and unloading, and an increase in the number of cars to a train. Cars embodying the advantages mentioned are already on order for the District and other lines. These will have, besides additional seating accommodation, four doors on each side, arranged so that one will be readily accessible to passengers, no matter where they may be seated.

Rail-less Trolley Operation

RAIL-LESS trolley operation has been used for several years in Europe as an adjunct to street railways. The operating figures for the Bradford Corporation Tramways for the eleven months ended March 2, 1920, are given in an article by R. H. Wilkinson in the July issue of *Tramway and Railway World*. The rail-less trolley, the street railway and the rail-less battery bus are operated by this company and comparative figures are as shown in the table.

On the basis of results obtained in practice Mr. Wilkson compares a rail-less trolley system for a new project using sixty and fifty-one as the respective seating capacities. He finds that the rail-less trolley is more economical on a single-track line up to a five-minute service and on a double-track line up to a three-minute service. He points out that the rail-less trolley is not so comfortable to ride in as the street car, is on a par as regards accidents and is not so reliable, but thinks it can be made so. He states it causes less obstruction to traffic when a breakdown occurs and can draw closer to the curb in loading and unloading.

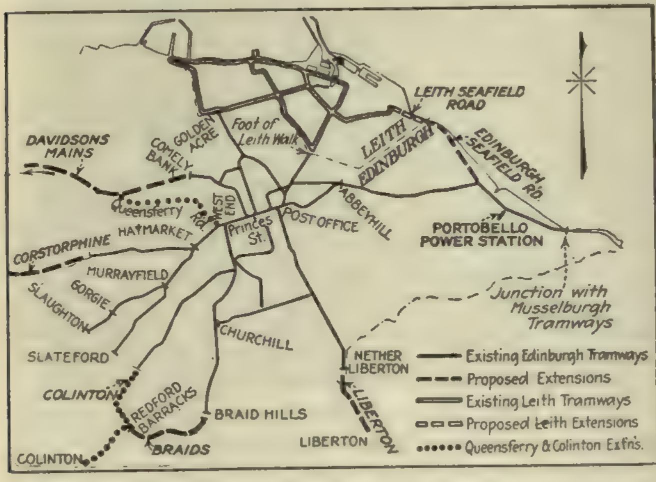
	Street Railway	Rail-less Trolley	Battery Bus
Traffic expenses per car-mile	17.97	16.24	25.82
General expenses per car-mile	3.32	2.04	2.07
Repairs and maintenance	12.66	11.11	6.29
Power expenses	6.5	2.49	3.26
Overhead expenses	5.93	5.2	7.57
Total (cents)	46.38	37.08	45.01
Mileage	4,807,328	350,221	8,959
Receipts per car-mile	51.77	23.31	...
Seats (cents)	60	29	29

The Place of the Bus Defined at Edinburgh

Through Runs to Adjacent Cities and Steady-Traffic Local Lines to Be Electrified—Motor Buses for Light Traffic

WHEN the municipality of Edinburgh took over the Edinburgh & District Tramways, June 30, 1919, it came into possession of a cable system which was not only badly run down but also undertracked. The intention of the city was to electrify and enlarge the system, as set forth in the ELECTRIC RAILWAY JOURNAL for May 3, 1919. However, several conditions arose that made immediate and extensive electrification impracticable. One factor was the terrific advance in the cost of track and a second was the impossibility of securing quick deliveries either of track or power equipment. Another complication was the desire of many people, for æsthetic reasons, to see Princes Street (the show thoroughfare) electrified on the top-cost conduit system, while the rest of the city was to have overhead trolley.

These several circumstances, plus the need for some immediate additional means of transportation, strongly favored the introduction of the motor omnibus. As the question was whether it would pay to convert to electric power or go to the motor omnibus entirely, the decision of the management as set forth to the Council on July 17, 1920, by R. Stuart Pilcher, tramways manager, and as supplemented by recent operating data, should be of interest to urban electric railways throughout the world.



PRESENT AND PROPOSED ROUTES AT EDINBURGH

Mr. Pilcher says that not even the first section, Pilrig-Nether Liberton (to Leith), could be operated electrically before the spring of 1922 because of lack of power. Following the Council's recommendations, he had started motor buses between Easter Road and Ardmillan Terrace and placed orders for more. The fact that the motor buses were being operated profitably and that they were being used to close down some of the northern cable routes (at least temporarily) had led many people to wonder if they were permanently to displace the electric car so far as Edinburgh was concerned. He would therefore venture to discuss the pros and cons.

The outstanding debt on the cable system May 15, 1920, was £462,761. The electrification was estimated to cost £695,700, spread over three or four years, but the fixed charges should not increase, as the cable debt would be decreasing as the electric debt increased. Since the estimated assets of the cable system convertible to electric traction were valued at £804,163, that sum would be virtually thrown away if motor buses were adopted instead. Furthermore, the cost of reconstructing the streets would have to be placed either upon the motor buses or upon the community taxes. The permanent way, as regarded renewals and repairs, really was in substantially the same position as the electric railways throughout the United Kingdom, hence the relative financial considerations as to car versus tram were not unique to Edinburgh.

One special condition was connection with the adjacent city of Leith, which, to please the public, would have to be either all bus or all car, since bodily transfer was intolerable. Leith already had a tramway system which was more economical than bus operation, so it appeared that the Leith-Edinburgh route, which includes the Pilrig-Liberton stretch, should be electrified. The Portobello section ought also to be electrified to allow through running with the Musselburgh Tramways.

Comparing the two methods for the cable routes of the city, Mr. Pilcher presents the following:

System	Capital Cost	Interest and Sinking Fund Charges per Annum	Interest and Sinking Fund Charges per Mile Run in Pence (2c.)
Converting cable to overhead system	£695,700	£56,014	2.334
Cost of providing same number of buses....	456,640	64,131	2 672
Cost of providing enough buses to equal car seats..	729,900	103,155	2.886

As car-seating capacity is fifty-two, against bus capacity of thirty-two, the buses must number 63 per cent more. The fifty-two-seat electric car could be operated at 18.12d. (36.24 cents) per mile, while the present thirty-two-seat buses cost 21.41d. (42.82 cents) per mile. The buses, however, would not have to give 63 per cent more mileage, because maximum capacity is required only during the rush hours. As the average speed of the bus would also be greater during the rush hours, Mr. Pilcher believes that the bus would be able to earn sufficient extra revenue to meet the extra cost of operation caused by its lower seating capacity. The total costs on this basis would be 20.33d. (40.66 cents) per car-mile, or 23.29d. (46.58 cents) per bus-mile.

After listing the merits and demerits of each type of vehicle and stressing the need of meeting rush-hour conditions, Mr. Pilcher concludes that: "It would appear for main lines of traffic, where the passenger traffic is assured and where it is dense, the electric car will be used, but where an infrequent service is sufficient, such as on a suburban route, or where the traffic is not fully developed, the motor bus will be used. I do not consider that the two systems are necessarily competitive, but rather supplementary."

On the four routes named in the report for July 1, 1919—May 15, 1920, the longest run is practically 3 miles and the fare 3d. (6 cents). The lowest fare, as on the tramways, is 1.5d. (3 cents) for a maximum length of 1.2 miles. There is no workmen's rate, but children between four and twelve years are carried at half rates with 1d. (2 cents) minimum. Several score buses are already in operation on these and other routes with earnings as high as 26d. (52 cents) a mile. The municipality also runs *char-à-bancs* (open touring cars), which are extremely popular with the visitors to this beautiful city.

Association News

ATLANTIC CITY CONVENTION, OCT. 11 TO 15

Changes in the Convention Programs

SECRETARY BURRITT has announced a few changes in the programs of meetings to be held in connection with the Atlantic City convention, as printed in the issue of this paper for Sept. 25, pages 607 and 608. These are summarized below.

American Association

The committee reports which will be read after Mr. McAuliffe's address on Tuesday morning will be that of the Aera advisory committee and that on company membership. This session will close with the discussion of the Federal Electric Railways Commission's report, led by Philip H. Gadsden, vice-president United Gas Improvement Company, Philadelphia, Pa.

On Wednesday the session will open with reports of the committees on fare systems and publicity and of the Committee of One Hundred.

Accountants' Association

On Monday afternoon the joint meeting with the T. & T. Association will be held in the Greek Temple from 3 to 4.

On Tuesday afternoon the paper on "Accounting for Material Received and Used, Including Inventories," by R. A. Weston, will precede that on "Cost-of-Service Accounting," by H. J. Davies.

Claims Association

On Monday afternoon the joint meeting with the T. & T. Association will be held in the Greek Temple from 4 to 5:30.

On Thursday afternoon, from 2:30 to 5, there will be a free-for-all discussion on these topics: (1) "The Increased Cost of Claims and Some of the Reasons Contributing Thereto." (2) "Prosecution of Claims for Damage to Company's property." (3) "How Best to Safeguard Releases from Attack." (4) "Value of Signed Statements." (5) "The Best Method of Keeping in Touch with Witnesses." (6) "Value of Secret Service." (7) "Handling Blind and Fraudulent Cases." This discussion will be followed by general business and the election of officers.

Engineering Association

On Tuesday afternoon the reports to be considered will be those of the committees on way matters and on buildings and structures. The Tuesday afternoon program as revised is as follows:

2:30 to 4:30 p.m. (Greek Temple). Joint meeting with T. & T. Association. Report of committee on safety car operation.

4:30 to 5:30 p.m. (Engineers' Hall). Papers on "Standardization and its Effect on Stores."

A. H. Armstrong's paper on "Railroad Electrification" has been transferred from Tuesday to Thursday afternoon, when it will be read after the discussion of technical reports.

The title of W. S. Murray's paper to be read on Wednesday afternoon has been changed to read: "Our Proposed National Power Policy."

On Thursday the reports of the committees on equipment and heavy electric traction will be discussed.

Transportation & Traffic Association

On Monday afternoon, from 3 to 4, the T. & T. Association will meet with the Accountants' Association in the Greek Temple for the discussion of the report of the committee on the collection and registration of fares, and from 4 to 5:30 in the same place with the Claims Association for discussion of the report of the committee on a code of traffic principles and to hear a paper by C. M. Talbert on "Automobile Hazards."

How the Delegates Will Be Entertained

THE convention entertainment will be under the direction of the following committee: Martin Schreiber, chairman; F. R. Coates, N. R. Garland, R. M. Campbell, R. C. Cram, George R. Lyman, Ross F. Hayes, C. H. Beck, L. E. Gould, Harold Hegeman, Thomas Cooper, J. A. Queenie, Charles C. Peirce, J. P. Barnes, J. C. Thirlwall and A. F. Walker.

The committee announces this as the program:

MONDAY, OCT. 11

Morning concert, Convention Pier, 11 o'clock, Strickland Orchestra.

Afternoon concert, Convention Pier, 3 o'clock, Strickland Orchestra, informal dancing.

Annual reception, ball room, Convention Pier, 9 p.m., in honor of the officers and ladies of the American, Accountants', Engineering, Claims and Traffic & Transportation Associations.

The reception will be followed by informal dancing.

TUESDAY, OCT. 12

Morning concert, 11 o'clock.

Ladies' bridge tournament, Convention Pier, 2:30 to 4 p.m. Play to start promptly at 2:30 p.m. Tournament open only to ladies wearing badges. Prizes will be awarded. Ladies are requested to arrange tables of four if possible. In cases where tables have not been arranged, the committee will gladly see that such arrangements are made prior to play. All visiting ladies are urged to enter the tournament. Mrs. W. F. Ham, hostess.

Afternoon concert, 4 o'clock.

Informal dancing, Convention Pier, 9 p.m.

WEDNESDAY, OCT. 13

Morning concert, 11 o'clock.

Ladies' obstacle tournament, Marlborough-Blenheim lawn, 2:30 to 4:30 p.m. Play starts promptly at 2:30 o'clock. Tournament open only to ladies wearing badges. Prizes will be awarded. All visiting ladies are urged to enter the tournament.

Afternoon concert, 4 o'clock. Violin solo, Abraham Ruvinsky, soloist, leader of Rail-Light Orchestra, Company Section No. 11 of the Toledo Railways & Light Company, Toledo, Ohio.

County Fair, ball room, Convention Pier, 9 p.m.

THURSDAY, OCT. 14

Morning concert, 11 o'clock.

Tea, Convention Pier, 4 p.m., Mrs. John H. Pardee, hostess, and concert, Strickland Orchestra.

Annual ball, Convention Pier, 9 p.m., music by Strickland Orchestra.

FRIDAY, OCT. 15

Morning concert, 11 o'clock.

Recent Happenings in Great Britain

Increased Fares for London Underground Sanctioned by Parliament —Larger London Buses—Labor Restless Again

From Our Special Correspondent

The London underground railway companies' bill to authorize them to charge higher fares passed through Parliament and received royal assent before the recess began in August. That was immediately followed by the companies issuing a statement to the effect that the revised scale of fares was being prepared but that it would not come into operation till the end of September. The newly authorized maximum fares are at the rate of 1½d. per mile or part of a mile, with a minimum of 2d. "Workmen's" tickets will be issued up to 7:30 a.m. and will be available for the return journey at any time during the day. The charge will not exceed the ordinary single fare for the double journey, with a minimum of 3d. (return). The companies do not propose to charge the maximum fares unless further emergency arises. They will continue their policy of giving preferential treatment to the longer-distance passengers, so the fare per mile in these cases will still be low though somewhat higher than before.

BY WAY, no doubt, of making it abundantly clear to the public that the increased fares are necessary, the companies have put up posters at their stations quoting the low dividends and in some cases the fact that there are no dividends at all on the ordinary stocks, and pointing out that to secure such meager results so many millions of passengers have been carried. Another form of this publicity work states that in the first six months of this year the associated companies carried 601,000,000 passengers; that each passenger on the average paid 2.02d., that on the average he cost 1.97d.; that the companies had left 0.05d., that this nearly broke the companies, and that only because of the Government subsidy and miscellaneous earnings were the companies able to maintain their solvency.

40 PER CENT INCREASE IN FARES

In the latter part of August, Lord Ashfield, chairman of the underground railways, in an interview stated that the companies did not intend to put into operation a greater average increase than 40 per cent over the pre-war fares, bringing the charge up to a little over a penny per mile. The fares on the steam railways of Britain, it may be mentioned, are now in many cases as high as 1¾d. per mile. Lord Ashfield also pointed out that there are still millions of passengers on the underground railways who pay only a penny each, while the terminal charges per passenger (printing, issue and collection of tickets, running of elevators, etc.) amount to about three farthings per passenger. If there is no further increase in working expenses the increase in fares of 40 per cent will allow of a dividend of 5 per cent on ordinary capital.

In connection with the fare question in London, there was a fluttering of certain dovecots during August over a proposal, which was defeated by a majority of only one vote in the London County Council, to abolish the 2d. all-the-way mid-day fare on the Council's tramways — started three or four months ago to encourage traffic during the slack hours of the day. The proposal was made by the highways committee of the County Council as one outcome of negotiations which have been going on between representatives of the Council and of the underground railways and the omnibus companies. The recommendation submitted to the Council was that subject to the omnibus companies agreeing that the fare for one section of about 0.6 of a mile should not exceed 1d. (this being the same as the new proposed Council's tramway fare) the charging of a 2d. maximum fare on the Council's tramways during certain hours of the day should be suspended. W. J. Squires, the chairman of the highways committee, in moving the proposal at a special meeting of the London County Council on Aug. 24, said it was the Council's desire to come to some understanding as to traffic on London tramways, omnibuses and underground railways. There should be a spirit of give and take, and he regarded the experimental 2d. fare as a direct cut against the omnibus company.

UNDUE COMPETITION UNDESIRABLE

G. H. Hume, who represented the Council before the Ministry of Transport and the omnibus companies, stated that the negotiations would not be taken up seriously till October, and undue competition was undesirable in the meantime. The omnibus undertaking proposed to do away with 1d. fares and to charge a minimum of 1½d.; they objected to the 2d., all-the-way mid-day fare, and it was proposed to meet them in this. Other councillors (including Labor men) contended that the 2d. fare had been successful and should he continued, and that the Council was not there to consider the interests of the shareholders of the companies.

The proposal was defeated by thirty-six votes to thirty-five. The decision is a fresh example of the difficulties arising from part of London passenger transportation being conducted by a municipality and part of it by companies. The jealousy of the former is always marked.

LARGER BUSES FOR LONDON

The size and the seating capacity of motor omnibuses in London are still increasing. The standard bus until recently seated thirty-four passengers. The next type, by means of a somewhat larger body and a modification in design, provides a seating accommodation for forty-six people. A number of this sort are now on the streets. In the end of August the Commissioner of Metropolitan Police agreed as an experiment to license a limited number of a new type, each of which will seat fifty-seven passengers. All the omnibuses mentioned are double-deckers, and the last type rivals a four-wheeled tramcar in capacity. It is said that the new vehicle keeps within the existing limit of weight, namely, 3½ tons unladen. At the time of writing no sample of it had begun operation.

It is expected that the London General Omnibus Company, which is in the underground "combine," will put up its fares at the same time the railways do. For this it does not need any Parliamentary powers. The company has resumed two all-night services of buses which were stopped owing to scarcity of men, vehicles and petrol during the war. These services are between the city and some northwestern suburbs. The buses run at intervals of about an hour between midnight and morning.

STRIKES CONTINUE

A truly remarkable record has been set up by the Great Eastern Railway by putting into effect a two-minute service of trains during the rush hours on certain of their suburban routes out of Liverpool Street Station in the city of London. This is said to be the most frequent service of steam trains in the world. The project for electrifying the company's suburban lines is still under consideration, but costs of everything are excessively high and it is not easy for the railways at present to raise additional capital.

Despite all the "settlements" that have been arrived at, sporadic strikes, often of the "lightning" variety, continue to take place on various tramway undertakings in England. They arise out of local grievances or disputes, and the Joint Industrial Council seems to be unable to prevent them. Tramway employees, like many other employees in this country, now go out on strike on the most trivial matters. Then in Scotland there was a twenty-four hour stoppage of some of the most important tramways, this being part of a one-day strike among various industries as a protest against a new act of Parliament allowing landlords to increase house rents—a thing prohibited during the last two or three years of the war. Glasgow tramwaymen threaten to strike because the Town Council will not recognize one of their trade unions. Another of these unions is already recognized. The Council evidently thinks that one union is enough.

It is announced that the government of New Zealand has accepted a tender of the English Electric Company for the electrification of the Arthur's Pass section of the main line railways. The route includes a tunnel 5¼ miles long through the mountains. The gradients range up to one in thirty.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Budget Reduced $379,000

Cincinnati Street Railway Director Orders Cut in Supplementary Budget—Total $554,000

The Cincinnati (Ohio) Traction Company has filed an application for supplementary allowances for 1920 as follows:

Way and structures	$ 72,818
Equipment	170,384
Power	277,540
Conducting transportation	380,626
General and miscellaneous	21,720
Total	$923,090

The explanation of the company may be summarized under these general heads.

The failure of the O'Brien law in the Supreme Court dislocated the financial plans for track construction upon which the budget of 1920 was based, necessitating a larger expenditure for this purpose. The outlaw switchmen's strike interrupted the company's regular supply of coal from the mines and made it necessary to purchase coal in the open market at almost double contract prices.

The decision of the Wage Board of Arbitration added 18 per cent to the scale for members of the union and thereby required adjustments affecting every department of the company. The latter is the larger and more important item.

STREET RAILWAY DIRECTOR SATISFIED

William C. Culkins, Street Railway Director, after reading the report of the arbitrators said that he was impressed with the justice of their conclusions in the matter affecting wages. Mr. Culkins reiterated the recommendation of Chairman Tuttle of the wage board urging the railway to introduce every economy possible. Mr. Culkins said:

> A general survey of the system by this department shows that during the middle of the day, and in the late evening on many lines, cars are running almost empty. The change of a few minutes in headways during the middle of the day would produce an appreciable inconvenience but would materially reduce operating expenses on the whole system and benefit the car riding public, who will, I am sure, co-operate cheerfully in working out of any economy which does not reduce service below the standard established.
>
> One-man car operation, through rerouting, crosstown connections and other matters have been previously called to your attention, as the need of conservation is greater now than at any other time.
>
> The total supplementary allowances requested would increase the total operating expenses for the year 1920 from $5,449,346 to $6,373,434 and require a total, including taxes, rentals and other deductions, of $9,628,000. The total receipts for the first eight months of this year were $5,809,471.
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> It seems reasonable, however, to expect an increase in traffic, but the number of revenue passengers for the last four months of 1920 will probably not exceed 42,500,000, or 2,500,000 more than in 1919. This would produce at an 8-cent fare approximately $3,440,000, or a total for the year of $9,249,000, which would be $379,000 less than the total allowance under the supplementary budget as requested.
>
> However, I am of the opinion that with economies suggested the company will be able to pay the new wage scale and still materially reduce expenses so that it will be possible to avoid increasing the present rate of fare.
>
> It is evident that the improvement of Eastern Avenue, Central Avenue and possiby Freeman and Hamilton Avenues will not be completed this year and the total estimated for this purpose will not be required before next year.
>
> The efficiencies suggested will reduce the consumption of power, and since the total excess over the budget for the first months of 1920 is $112,000 the amount requested, $277,000, seems excessive, especially in view of the improved railroad freight conditions which should assure a supply of high-grade coal.
>
> The greatest effects of the schedule readjustment and the greatest savings should be shown in "conducting transportation." Of the $21,720 requested for "general and miscellaneous," a satisfactory reduction in the injuries and damages accounts promises to offset increased costs of supplies coming under this heading.
>
> It is therefore ordered that the supplementary budget required by the company be not granted and that in lieu thereof the following supplementary allowances be and the same are hereby granted:

Way and structures	$ 30,000
Equipment	150,000
Power	200,000
Conducting transportation	150,000
General and miscellaneous	14,000
Total	$544,000
Reduction	379,000

City Representatives to Meet at Atlantic City

William C. Culkins, Street Railroad Director at Cincinnati, Ohio, and secretary of the American Association of City Representatives of Electric Railways, announced that on Oct. 13 at 2 p.m., during the convention of the American Electric Railway Association at Atlantic City, the Association of City Representatives of Electric Railways will convene at the Hotel Traymore. Mr. Culkins has requested each member to prepare a paper on local conditions to be read before the assembly.

Among those who have signified their intention of attending the meeting are: Thomas Murphine, former Superintendent of Utilities, Seattle, Wash.; M. M. O'Shaughnessy, City Engineer, San Francisco, Cal.; William C. Culkins, Director of Street Railroads, Cincinnati, Ohio; Fielder Sanders, City Street Railroad Commissioner, Cleveland, Ohio; Lynn B. Milam, Director of Public Utilities, Dallas, Tex.; William L. Sause, Street Railroad Commissioner, Youngstown, Ohio; C. R. Barnes, Street Railroad Commissioner, Rochester, N. Y.; R. F. Kelker, Jr., Chicago, Ill.; John W. Everman, Dallas, Tex.; D. W. Henderson, Seattle, Wash; Colonel E. M. Stayton, Kansas City, Mo.; and W. S. Twining, Philadelphia.

New Orleans Report Public

Special Masters Acting for Court Recommend Service-at-Cost Plan and an Eight-Cent Fare

The report of the three special masters arbitrating the differences between the trainmen and the New Orleans Railway & Light Company was filed with Judge Foster on Sept. 20. The document, which is signed by Charles J. Theard, George H. Terriberry and P. J. O'Leary, recommends:

> That the citizens of New Orleans pay a fare of 8 cents.
>
> That the company be allowed interest on its investment at the rate of 7 per cent. The valuation placed at $41,500,000.
>
> That the company immediately adopt the service-at-cost plan.
>
> That the men be paid 40 cents for the first six months in service, 52 cents the next six months and 55 cents thereafter. The men now are getting 38, 40 and 42 cents an hour.
>
> That the local union and its affiliation with the Amalgamated be recognized.
>
> That the company sign the contract of 1918 with certain reservations. These reservations in some instances are those requested by the company, one of which is the abolishment of the five-minute layover. The company also has the right to say how it shall run its cars.
>
> That school children pay not more than 5 cents with transfers.

EASY TO ADOPT NEW GRANT

The special masters agree with counsel for the New Orleans Railway & Light Company that the adoption of a service-at-cost plan in the city of New Orleans should not involve serious difficulties nor protracted negotiations. They express the opinion that it would appear to be improbable that difficulties will arise in selecting from these various plans such parts as are appropriate and adaptable to local conditions and incorporating them into a fair and workable cost of service plan.

Federal Judge Foster rendered a decision on Sept. 30 on the report of the special masters in which he granted the wages awarded to the motormen and conductors, holding that until such time as the service-at-cost plan was adopted an 8-cent fare was necessary to meet the wage increase and enable the receivers to give adequate service. He held further that since the city made no objection to the masters' recommendation of an 8-cent fare, he took it for granted that the city would not oppose the increase. He recognized the Amalgamated, but held that the men would have to abide by the masters' recommendation regarding working conditions. He disapproved and set aside the masters' valuation of $41,500,000 for the property in deference to the representatives of the stockholders, who objected to the valuation. The report now goes to the Commission Council, which will meet on Oct. 5 for final action.

Employment Control Upheld

District Court Says Employees Have Right to Organize, but Employers May Fix Employment Conditions

The Supreme Court of the District of Columbia has denied the application for an injunction sought by the Brotherhood of Railroad Trainmen to restrain the officers of the Washington & Old Dominion Railway from discharging any of the plaintiffs from the employ of the railway by reason of their affiliation with the brotherhood or for any cause not the result of the fault or misconduct of the plaintiff.

ROAD A COMMON CARRIER

The conclusion of the court as noted briefly in the ELECTRIC RAILWAY JOURNAL for Sept. 11 is that the defendant railway is such a carrier by railroad as comes within the purview of Title 3 of the transportation act of 1920. The court says that the company's right to dismiss its employees for becoming members of the labor union is supported by the judgment of the highest judicial tribunal in the country and that this judgment, in cases within the jurisdiction of the court, the court must recognize and enforce.

It was sought to have the injunction continued pending a decision of the so-called labor board created by the act of Congress, known as the transportation act of 1920. The bill also prayed that pending the decision of the labor board referred to the defendants be required to reinstate such of its employees as had been discharged because of their affiliation with the railway brotherhood.

The Washington & Old Dominion Railway insisted that it was an interurban or suburban electric railway not operating as a part of the general steam railroad system of transportation and was excepted from the provisions of section 300 and sections following in the transportation act. The railway admitted that some of the plaintiffs and other employees of the company had been dismissed from its employ and that those still in its employ at the time of the filing of the bill were threatened with dismissal because of their union affiliations. The railway contended that there was no equity presented by the bill and that the court did not have the authority to grant the relief that is sought.

EMPLOYERS HAVE RIGHTS, TOO

The court found that both the declared purpose of the company, the business contracted by the railway and the character of the territory through which the line ran, removed it from the category of either an interurban or suburban electric railway. On the issue of the matter of the policy of the road to prevent its employees from joining labor unions, the court said that Mr. Davis, the manager, very frankly stated the reason which influenced this policy.

The court also said that the right to labor was a social right which inhered in the individual and as a corollary to that the right not to work must equally be recognized. With the recognition of the right to belong to organizations of labor unions, so called, was another right which belonged to the employer. That right was to impose conditions upon those who sought employment from a given employer, be that employer an individual or a corporation. In this connection the court said:

> It may be asked what becomes of the right of employees to organize themselves into a union, or to become members of a union already in existence, if, as a consequence of doing so, the employer may exercise his right as recognized by the Supreme Court in the cases cited? The answer may not be easy to formulate, but this Court is not called upon to answer the question. Its duty is to give effect to the authoritative opinions and decisions of the Supreme tribunal. These, it would seem, give to the defendant railway company the right to dismiss its employees if they join a labor union.
>
> It may be urged that to so hold is to render vain the right which the plaintiffs claim is given them under the transportation act of 1920. But without stopping to inquire whether they are given rights under that act of the character claimed in the bill, it is enough to say that if that act undertakes to restrain the power of employers to discharge their employees for joining a labor union, the act would then appear to come within the denunciation of such legislation in the opinion of the Supreme Court to which attention has been called.
>
> It might be appropriate to point out that the provisions of the transportation act relied upon by the plaintiff contemplate, apparently, action by the labor board where application by an existing labor organization is made to it, or made by unorganized employees to the number of 100 or the labor board's own motion. It is alleged in the bill that there are not 100 unorganized employees of the defendant railway to sign the petition to the labor board, contemplated. But even so, the labor board may on its own motion, "if it is of the opinion that the dispute is likely substantially to interrupt commerce" . . . decide such disputes as it is by the act given jurisdiction to hear and determine.
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> It is not for this court to discuss the policy which from the evidence submitted is the one adopted by the defendant railway employer with respect to its refusing employees becoming members of a local union. But it is well to keep in mind the evident policy of the National Legislature, which impliedly, at least, recognizes the right of employees to be members of a labor union.

Service Resumed Pending Inquiry

At a hearing before the Public Service Commission for the First District of New York on Sept. 16 Commissioner Barrett, acting for the commission, read a letter which he had just sent to Frueauff, Robinson & Sloane, attorneys for the receivers of the Manhattan & Queens Traction Corporation, pointing out the franchise obligations of the company and directing it to resume service at a 5-cent fare, pending the continuation by the commission of the investigation of the company's affairs made necessary by its application for increased fares. The attorneys for the receivers complied with the commission's request in a letter to Commissioner Barrett. In this letter they said that with many statements of the commissioner they were in accord, but that they have already shown that service cannot be rendered with the fare at 5 cents.

Bus Competition Protested

Pacific Electric Railway Opposes Direct Stage Competition—Increase in Fares Hurt Railway

The Pacific Electric Railway, Los Angeles, Cal., has instituted a fight before the California State Railroad Commission against direct auto stage competition on all parts of its system. A petition filed by the interurban system on Sept. 24 with the Railroad Commission protests and asks that wherever such competition is authorized or permitted to exist, the Pacific Electric be allowed to cancel all of its interurban commutation fares.

BLOW TO COMMUTERS

This drastic proposal as now made would be a serious blow to thousands of interurban commuters. It is made as the result of an application recently filed with the commission for the granting of an autobus franchise between the cities of Los Angeles and Alhambra.

An application of similar nature has since been filed with the commission in anticipation of autobus competition being sanctioned between Los Angeles and Pasadena. Similar action will be taken by the company to cancel the commutation fares between Los Angeles and Pasadena and to eliminate free transfer privileges now in effect in Pasadena from local lines to interurban lines on through business between Los Angeles and Pasadena.

The applicants for the competitive bus line between Los Angeles and Alhambra contend that unsatisfactory service on the interurban line and the unjust burden resulting from recent increased rates make the granting of a bus line franchise an absolute public necessity.

The bus line proposes to charge the same fare in effect on the electric line before the recent 20 per cent increase. There is nothing definite in the bus line proposal as to a commutation fare. All bus lines avoid this issue, always going after the one-way and round-trip business.

RAILWAY DENIES NECESSITY

In its protest to the commission the Pacific Electric Railway denies any public convenience or necessity for the proposed auto stage line. The electric line claims it is now furnishing sufficient and adequate service and would suffer material loss in patronage should the stage line be permitted to operate. In conclusion the company said:

> In the event your honorable body should see fit to grant the application of the bus line, the Pacific Electric Railway hereby makes application for authority to cancel all commutation tickets, and retain in effect only one-way and round-trip tickets.

It is cited that the electric line pays out 30 per cent of its revenue for taxes and maintenance of right of way, while the auto stage lines pay out only 2 per cent of their gross revenue in state taxes and the public maintains the right of way free.

Government Ownership Planned

Program of Mexican Government for Taking Over Electric Utilities Causes Surprise

Foreign investment interests in Mexico express much surprise at the authoritative announcement which has just come from the capital to the effect that the Mexican government plans to purchase the extensive holdings of the Mexican Light & Power Company and the Mexican Tramways, Ltd., including the hydro-electric plant at Necaxa. It is stated that an inventory of these properties has just been made and that the proposed purchase price has been practically agreed upon by the interests involved.

The making public of the government's plans to acquire these holdings was all the more of a surprise, coming, as it did, upon the heels of an authentic statement that the Mexican Tramways, Ltd., had under consideration plans for resuming construction work upon its two proposed interurban electric lines, one to run from the city of Mexico to Puebla, 130 miles, and the other from the city of Mexico to Toluca, a distance of 45 miles.

A $12,000,000 INVESTMENT

More than $12,000,000 gold was expended in the building of dams for the storage of water in the mountains, the installation of a hydro-electric plant of 200,000 hp. and the construction of transmission lines from Necaxa to the city of Mexico, Puebla and El Oro. How much money in addition to this was invested in the lighting system and electric railways of the capital and Puebla is not publicly known. The Mexican Light & Power Company and the Mexican Tramways, Ltd., are owned by a British syndicate.

It is the purpose of the Mexican Government to finance these pending transactions by issuing bonds, which will be retired from the profits of the companies. The details of how this financing is to be accomplished are lacking, however, in the preliminary announcement of pending negotiations.

Valuation Proceedings Begun

The valuation proceedings in connection with the appeal of the Philadelphia (Pa.) Rapid Transit Company for additional revenue started on Sept. 23. Commissioners Benn and Clement sat to hear the testimony regarding the company's holdings. A mass of evidence tending to show the length of mileage owned and operated by the company was introduced. In order to expedite matters with the city the commission postponed the hearing until Sept. 30 so as to give the city an opportunity to select its experts.

The company was ordered by the commission to throw open its books and give all data relating to the valuation as well as the actual property to the city's experts, so that the latter will have every opportunity to check up the figures that will be submitted to the commission in the valuation hearings.

The hearing opened with the reading of a paper by Coleman J. Joyce, counsel for the company, in which he explained that the company would be unable to submit anything but the inventory of the various equipment that makes up the system. The actual pricing of the items submitted, he said, would be made as the hearings progress. In explanation of the inability of the company to present the valuation as ordered by the commission. Mr. Joyce said that the failure of the company to get the higher fares it sought in June had made necessary certain economies that precluded the employment of the pricing experts required to expedite the valuation.

He also delivered a plea for the granting of a higher fare by the commission, pointing out that a higher fare had been allowed in Pittsburgh, and in Philadelphia, in the case of the Philadelphia Electric Company, higher rates were permitted while valuation proceedings were in progress. Mr. Joyce said that the work of compiling the valuation had started in November, 1918. At various times as high as 250 men had been employed on the valuation.

Employees Desire to Run Road

Trainmen in the employ of the Eastern Massachusetts Street Railway believe the Chelsea division, now run at a loss, can be made to yield a good profit, and desire an opportunity to operate it in their own way, expressing a willingness to make good any losses entailed by such management.

In an open letter to the public, signed by President James M. O'Brien, the Chelsea union declares it feels as though it could reduce the fare, give more frequent service and resume operation of lines which have been discontinued. The letter follows:

> To the public: The employees of the Bay State System, in the Chelsea division, who are members of the Amalgamated Association, desire to inform you that we did not raise the fare from 10 cents to 15 cents, and that we did not approve of it at the time it was done.
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> The company alone is responsible for the advance and the only thing we can do is to collect whatever rate the company charges. We believe the company has made a mistake in trying to get additional revenue in this manner.
>
> Raising the rate of fares certainly drives away riders, and that of course results in fewer cars being run, and causes more of our men to be laid off. We are inclined to believe that someone in charge of running the Bay State system either does not understand how to run the property or has some idea in mind other than giving the public service.
>
> We believe that the Chelsea division is a good paying proposition and would welcome the opportunity of trying to run it in our own way. We feel as though we could reduce the fare, give more frequent service, and resume operation of lines that have been discontinued. We are willing to share in the losses, if there be any.
>
> According to its own statements, the present management must be convinced that it is a failure. Why do the officers stand in the way of letting others try it; why don't they stop before they put the entire property in the junk pile?

The proposal from the men is to be put up to the trustees of the Eastern Massachusetts Street Railway by the employees.

$175,000,000 Program Suggested

Greater New York's Transit Needs for Twenty-five Years Planned For by Commission's Engineers

General plans and studies for enlargement and extension of the city-owned rapid transit system in all of the boroughs of Great New York have been announced by Transit Construction Commissioner John H. Delaney and the engineering forces of the department. The plans have been prepared by Daniel L. Turner, chief engineer of the commission. The scheme as worked out has been issued in pamphlet form for consideration for the purpose of evoking suggestion and criticism from the operating companies, engineers and civic organizations generally.

As laid down in general terms the program for transit development is intended completely to take care of the city's needs as long as it is confined within its present boundaries. A definite program is suggested for the next twenty-five years, as such needs can now be forecast. Studies have been made in order that municipal growth may not be retarded in any direction and for the prevention of abnormal and congested conditions in certain sections of the city and strangulation of growth in other areas.

830 MILES OF LINE PROPOSED

In the proposed routes for the complete program provision is made for adding 830 single track miles to the present rapid transit facilities of the city, which now aggregate approximately 616 miles of single track elevated and subway lines. Projected lines and extensions to the existing lines, wherever they may originate in outlying boroughs, are laid out to enter and traverse the heart of the city, which from the transit viewpoint is 8 square miles in the section of Manhattan south of Central Park between Second and Tenth Avenues. The plan contemplates the addition of forty-two single track river crossings to the thirty-four single track river crossings provided in the existing dual transit system. All of the proposed crossings will be by means of tunnels. In the new project will be twenty-one additional two track tunnels connecting the boroughs of Manhattan, the Bronx, Queens, Brooklyn and Richmond.

No close estimate of the cost of construction of the enlarged transit system is possible at present, and it is not intended that the comprehensive scheme as laid out in its entirety will be undertaken at once, but that it should be proceeded with gradually and continuously. At pre-war prices it is estimated that the lines contemplated in the suggested program would cost approximately $175,000,000. At present prices, however, it is estimated that this cost would amount to $350,000,000 exclusive of equipment, interest during construction, engineering and superintendence.

Wages Vary with Net

Elgin & Belvidere Men Sign Contract with Wage Scale Under Which They Share in Earnings

Bion J. Arnold, sole owner and operator of the Elgin & Belvidere Electric Railway, Elgin, Ill., has entered into a new contract with his trainmen who are organized as Division 507 of the Amalgamated Association, which embodies a new principle in the matter of wage determination. A "basic rate" of pay of 31 cents, 32 cents and 33 cents, respectively, for first year, second year and senior men is provided, and to this is to be added an "increased pay" of an amount sufficient to make up the rate of pay contained in a table in the contract and varying upward with increasing net income.

PLAN SIMPLE IN OPERATION

For example, if the difference between gross receipts and operating expenses for the current month is between $3,500 and $3,000, the total rate of pay for that month is to be 43 cents, 44 cents and 45 cents an hour. If, during the next month, the net revenue should be between $4,000 and $3,500, the rate per hour would be 46 cents, 47 cents and 48 cents for that month.

The rate of pay is determined each month for the current month. At the end of the first fifteen days of any month, the net revenue is computed and multiplied by two to indicate the monthly net, and the men then paid for this first fifteen days, accordingly. The sliding scale thus determined varies for senior men from the basic rate of 33 cents an hour for a net earning of less than $2,250 per month to a maximum of 63 cents an hour for a net income of $6,000 or over.

The contract specifies that the operating expenses of the company shall be kept in accord with the Interstate Commerce Commission standard classification of accounts and shall include the actual cost of all labor and all other expenses incidental to the operation of the road, it being understood that 25 per cent of the gross receipts may be expended for maintenance and renewals, and 4 per cent expended or reserved for injuries.

CAPABLE OF WIDER APPLICATION

The rate of pay for the last half of the month is determined by taking the actual gross earnings for the month. Provision is made that checks drawn for the pay of the men shall be accepted by the men temporarily with the understanding that adjustments will be made within sixty days from the close of every month, and additional checks sent to cover the amount due the men, or deductions made from subsequent amounts to them if the amount paid was at a rate in excess of what was actually earned, according to the sliding scale.

While this plan has been worked out on a small property, Mr. Arnold considers it fundamental and capable of general application, provided that the companies are willing to accept a reasonable rate of return upon the actual cash invested in the property or upon a fair valuation. In the case of the Elgin & Belvidere Railway, which has never been profitable, the company will earn about 3.5 per cent on the actual cash (not stocks and bonds) invested in the property when the men are receiving 45 cents an hour and 5.5 per cent when the men are receiving 60 cents an hour. The whole plan is based on the theory that both the company and the employees prosper in good times and suffer in bad times, in proper proportion, the limit of the burden borne by the men and the extent to which they prosper being fixed by the wage scale tabulated in the contract. Mr. Arnold states:

> In our case we will probably never reach the 63-cent limit, although if we could I would be glad to see the men get the wage provided, but the probability is that the wages will run from 33 cents to 54 cents an hour, the 33 cents applying probably only during January and February of each year.

Another interesting clause of the contract is that the union employees of the Elgin & Belvidere Railway have agreed to maintain good relations with the union employees of the Aurora, Elgin & Chicago Railroad, which connects with it at Elgin, and co-operate with the non-union employees of the Rockford & Interurban Railway, connecting with it at Belvidere, in the establishment and maintenance of various through service to the end that the volume of business done by the respective companies may be increased.

Back pay has been paid the men from July 15, the date of expiration of the old contract. For the last half of July the men received 51 cents an hour and they will probably receive 51 cents for August, although the exact figures have not yet been determined. They will probably receive between 48 cents and 51 cents for September. The men have thus apparently received a raise of pay of from 8 cents to 11 cents an hour under the new contract.

Newspaper Reviews Railway Situation

In order to acquaint the residents of Cleveland with the present situation of its street railway system a series of articles about the Cleveland Railway is being published in the Cleveland *Plain Dealer*. Two installments have already appeared written by two members of the staff of that newspaper. The object of the articles is to present to the people of Cleveland the real situation with respect to its railway, discussing its present needs and future improvements. It is hoped that the digesting of these accounts will move people to help and not hinder the railway in giving its best service to the city. In the articles so far published it has been shown the system undoubtedly needs new equipment to maintain efficiency in transportation. The ways and means of acquiring this capital will be discussed in subsequent articles.

Council Repasses Measures

Toledo Body Clears Way for Railway Settlement at the November Election

The City Council at Toledo, Ohio, started the Milner service-at-cost ordinance and the twin bond ordinances providing for an issue of $7,000,000 of bonds to acquire and construct a municipally owned railway system on the way to the voters when it finally approved them at the meeting of the Council on Sept. 27, without a dissenting vote. It had been previously agreed that they would be passed without opposition.

PREPARING FOR CAMPAIGN

It is expected that Chairman W. L. Milner, of the service-at-cost commission, will lead in the campaign before the people for the adoption of the ordinance. No organized opposition to the Milner plan has been brought out except that voiced in the Scripps afternoon newspaper, the *News-Bee*. This paper is also supporting the municipal ownership plan as it did in the previous campaign. During the negotiations on the franchise the paper always supported the Milner commission as opposed to Henry L. Doherty and the company interests. Now it is turning against Milner in an effort to defeat the franchise after it has been approved by Council twice.

The campaign against the ordinance so far has been in general terms against the Tayler plan. The *News-Bee* has said that it is like "signing a blank check" to give the railway such a working plan. It is also extensively advertising the Wilcox statements regarding the Tayler plan.

It will be remembered, however, by many that while Mr. Doherty and the commissioners were trying to reach an agreement, Mr. Doherty objected to the Toledo plan largely because it differed from the Tayler plan as in force in Cleveland.

With the twin bond ordinances the taxpayers of Toledo will hand over to the Council $7,000,000 to spend *carte blanche*, except that it shall be for a transportation system. Radicals are opposing the measure because it does not provide for buses alone and others are opposing it because it does not provide for taking over the present system of transportation.

The service-at-cost plan at Toledo does not mean death to municipal ownership. It provides for municipal ownership in a series of small payments to be made one each year of the twenty-five years of the grant, or ownership or lease on short notice at any time in the twenty-five years.

It is expected the campaign for the Milner ordinance will open very shortly. Municipal ownership advocates have announced no plan as yet. W. L. Milner, chairman of the commission, will lead the business interests in favor of the service-at-cost and permanent settlement of the railway difficulties of Toledo.

Formal Appeal Made for Wage Rehearing

The Public Service Commission of Missouri has been petitioned by the attorney for the employees of the United Railways, St. Louis, Mo., to set aside its recent order denying the men a rehearing of their application for increased wages. The order of the commission sitting as a board of arbitration was for an advance of 5 cents an hour in the wages of the men. Most motormen and conductors are paid at present 60 cents an hour. The motormen and conductors recently voted to accept this award.

The attorney for the men issued a statement saying that one reason for the men's petition was that the order denying a rehearing was not issued by the same board of arbitration which granted the advance of 5 cents an hour, as after that action Commissioner Blair resigned from the commission and was replaced by Commissioner Kennish, who cast the deciding vote on which a rehearing was denied. The men ask that Mr. Blair be permitted to assume his old place as one of the arbitrators and that he vote on a rehearing.

Worcester and Springfield Wages Adjusted

Employees of the Worcester (Mass.) Consolidated Street Railway must accept the wage compromise of the company though they defeated the proposition by a vote of 504 to 420. The agreement which exists between the Springfield and Worcester unions is that each must abide by the total vote of both cities and the men of Springfield gave a sweeping "yes" to the proposal. The compromise carries with it an increase of 7 cents an hour for the second six months of this year, an additional 1 cent an hour for the first six months of next year and 3 cents an hour more after June 1 next.

Last spring the members of the Worcester division of the Amalgamated Association made demands on the company for an increase to 95 cents an hour. The question was to be referred to a board of three arbitrators, two of whom were Bentley W. Warren, Boston, for the company, and James H. Vahey for the employees. The third arbitrator was to be selected by these two men.

A time limit has been imposed for the selection of a third arbitrator and on the date of expiration the company announced that it had an offer to make to the men. The proposition from the company to the men which was voted on and accepted is as follows:

From June 1, 1920, to Dec. 31, 1920, 7 cents an hour, or 63 cents more a day.

From Jan. 1, 1921, to June 1, 1921, 8 cents an hour, 72 cents a day.

From June 1, 1921, to Dec. 31, 1921, 11 cents an hour, 99 cents a day.

Worcester rate on hourly basis same as present.

Springfield rate figured on daily basis.

Operators of one-man cars 13 cents an hour over rate paid on two-man cars.

All other conditions to remain the same.

Miscellaneous employees to receive the same rate per hour as uniform men.

News Notes

Big Plan Dies.—The plan of a proposed tunnel under East Fifty-fifth Street, Cleveland, known as the Barber project, has practically become extinct. On Sept. 24 a plot of land considered essential to carrying out the project passed into the hands of a realty corporation. At the time the plan was first advanced people of Cleveland were led to believe that the completion of this tunnel meant an ocean port for Cleveland. This now seems remote.

Bus Legislation Fails. — At the special session of the Legislature of New York, called to consider the housing situation, an effort failed to enact legislation fostered by Mayor Hylan of New York to permit the city to own and operate motor buses. The courts have already ruled against the operation of such vehicles in competition with the railways and have stayed the hand of the city in its effort to expend $1,000,000 for motor vehicles. The bus proposal was opposed by counsel for the New York Railways, the Interborough Rapid Transit Company and the Brooklyn Rapid Transit Company.

Wage Increase in Charlotte.—Z. V. Taylor, president of the Southern Public Utilities Company, Charlotte, N. C., has announced a new wage scale for the employees of his company. The men had submitted a contract which called for so great an increase that the company in view of its limited revenue was unable to meet the request. However, at a meeting where company officials and representatives of the men were present, a compromise was reached and the men of Charlotte, Winston-Salem and Greenville signed an agreement for the next twelve months which will give them an increase of 5 cents an hour. The new scale is as follows: For the first six months, 43 cents; second six months, 44 cents; second year, 45 cents; third year and after, 47½ cents. Operators of one-man cars will receive 5 cents an hour above the scale.

Interurban Franchise Case Heard.—The Wisconsin Supreme Court heard final arguments on Sept. 25 in the Milwaukee interurban franchise case. A decision is expected within a few weeks. The controversy resulted from the demand of the city of Milwaukee that the Milwaukee Electric Railway & Light Company obtain an interurban franchise for the operation of interurban cars over its city lines. This the company refused to do. The city thereupon obtained a restraining order. When the company prepared to obey this order by stopping all its interurban cars at the city limits and compelling passengers to get off and get on the cars again after the cars had crossed the city boundary line, the state intervened and the execution of the injunction was delayed pending a hearing by the State Supreme Court. The case was reported in ELECTRIC RAILWAY JOURNAL of May 22, 1920, page 1076.

East St. Louis Arbitrators Selected.—After conferences between Maurice V. Joyce and C. E. Pope, attorneys representing the East St. Louis & Suburban Railway, East St. Louis, Ill., and the men employed on the interurban lines of the company, Edward J. Coffey, East St. Louis agent for the Southern Railroad, was selected chairman of the board to arbitrate the wage demands of the men. David M. Walsh and C. E. Smith are the other members. The men are receiving from 48 to 53 cents an hour. Last April they presented a demand for an increase to 95 cents an hour. Whatever increase is granted them will be retroactive to May 1. Three weeks ago the Alton, Granite City & St. Louis Traction Company, controlled by the East St. Louis & Suburban Company, was placed in the hands of receivers and the line is now being operated under the supervision of the Federal court. Shortly afterward the receivers agreed to an increase of 6 cents an hour to men employed on the city divisions of the system and 7 cents to men employed on the interurban cars. The men have not voted on the proposition to accept the increase.

Program of Meeting

Public Utilities Association of West Virginia

The Public Utilities Association of West Virginia will meet at Charleston, W. Va., on Oct. 5, for the election of officers and the transaction of other business.

Joint Meeting in Providence

New England Street Railway Club Invites Rhode Island Company Section to Join in Meeting

The next meeting of the New England Street Railway Club will be held on Oct. 7 in Providence, R. I., at the Narragansett Hotel. The Rhode Island Company Section No. 12, A. E. R. A., will be guests, in what thus becomes a joint meeting. Elaborate plans are being made for this novel meeting, according to I. A. May, president of the club. At least 250 are expected to attend. There will be an afternoon session, a dinner and an evening session. The meeting will be addressed by Fred A. Cummings, publicity agent of the Eastern Massachusetts Street Railway, and the ensuing discussion is expected to be lively and instructive. At the evening session, two addresses are planned, one of which will be by William C. Bliss, chairman of the Public Utilities Commission of Rhode Island; the other speaker will be Joseph F. Berry, attorney for the Connecticut Company in Hartford.

Financial and Corporate

Norfolk Valuation Submitted

Taylor-Cooke Report $8,750,000—Company Seeks Valuation of $11,000,000 at 1920 Prices

The report of A. Merritt Taylor and his associate, Charles B. Cooke, Jr., on the Norfolk street railway problem has been made public. Mr. Taylor finds the value of the property to be $8,750,000 and suggests a return thereon at 8 per cent. He would retain the 6-cent fare within the city limits, establish additional fare zones on certain county lines and eliminate ultimately the 2-cent transfer charge.

It is the idea of Mr. Taylor to revise the franchise and relieve the company from street paving and from making a return to the city of moneys secured from the 2-cent transfers. He would continue the use of safety cars and eliminate jitney competition. A rehabilitation program of calling for the expenditure of $830,572 and a construction program calling for work to the total of $1,269,395 are suggested. Rerouting plans are described in detail. The report was made at the instance of the city. Its purpose is to develop and define the respective rights and obligations of the city and the Virginia Railway & Power Company and find solutions of the traction situation which will result in good transit facilities.

REPORT DISCUSSED BEFORE COMMISSION

The report was submitted and discussed at a hearing held recently before the Norfolk Public Utilities Commission. At the hearing Thomas S. Wheelwright, the president of the company, said that he agreed with all the recommendations in the report except as to the valuation of $8,750,000. Over this matter of valuation there was a discussion between Mr. Taylor and Mr. Blood of Stone & Webster, whose reproduction value of $11,000,000 was checked and accepted with slight modifications in the Taylor-Cooke report. The $11,000,000 valuation is based on present prices. Mr. Blood and representatives of the company contended that this was the proper basis of valuation. Mr. Taylor's figure was about midway between the reproduction cost at 1914 and 1920 prices.

President Wheelwright for the company said that he was greatly impressed with the recommendations in the report and with the thoroughness of the document, but that he was disappointed with Mr. Taylor's revaluation figures. These figures, he said, were lower than the company had hoped for, for "rate-making" purposes, and lower by nearly $3,000,000 than the estimate by Mr. Blood, which he considered fair. He expressed concern about the ability of the company to raise $1,600,000 suggested by Mr. Taylor to be spent within the next fifteen months.

All of the recommendations of the Norfolk Public Utilities Commission must be addressed to the City Council. The commission has within its power the right to accept the Taylor-Cooke findings and figures on those of Stone & Webster or to submit a report of its own to the Council.

The principles upon which Mr. Taylor's valuation was based were stated in writing by him prior to his undertaking the responsibility of acting for the city. He acted on the expressed understanding that he would appear in a judicial capacity and not as an advocate.

"Saturday Night" Reviews Federal Report

The Detroit *Saturday Night* of Sept. 4 contained a very interesting page summarizing the report of the Federal Electric Railway Commission. In the center of the page under the title "Sanity on Street Railway Problem" the editor explains what the problem was before the commission, who were the members and the witnesses. The rest of the page under such captions as "M O Is No Panacea for Street Railway Ills, U. S. Commission Finds," "How the Trolley Lines Can Be Put on a Sound and Efficient Footing," "Why Railways Can't Get Money" and "What Has Happened to Fares" tells the plight of the electric railways as outlined by the President's commission.

Interurban Surplus Increased

Boston & Worcester Railway Has Net Income for 1919 Three Times That of 1918

The income statement of the Boston & Worcester Railway for the year ended Dec. 31 shows that the total operating revenue increased from $882,666 in 1918 to 948,936 in 1919. This was an increase of $66,270, or 7.3 per cent. At the same time the operating expenses increased to $732,842 as compared with $689,174 in 1918, an increase of $43,668, or 6.3 per cent. The net revenue from railway operations increased 11.7 per cent, changing from 193,492 in 1918 to 216,094 in 1919. The expense due to taxes was considerably reduced.

In 1918, the taxes were $58,087, but decreased to $46,601 in 1919. This was a reduction of $11,486, or nearly 20 per cent over 1918. As a result of the increase in net revenue and a decrease in taxes, the gross income increased 25 per cent, or $34,088 over 1918. The net income transferred to profit and loss changed from $6,931 in 1918 to $29,488 in 1919. The operating ratio decreased 1 per cent. Total car-miles for 1919 amounted to 1,835,974, while the total car-hours were 138,040. The company owns more than 83 miles of track between Boston and Worcester. A reserve of $12,000 for depreciation was deducted from the yearly surplus.

INCOME STATEMENT BOSTON & WORCESTER RAILWAY

Year Ended Dec. 31:	1919	1918	Percentage Change Over 1918
Operating revenues:			
Revenue from transportation	$934,996	$869,566	+ 7.5
Other railway operations	13,940	13,100	+ 6.4
Total operating revenue	$948,936	$882,666	+ 7.3
Operating expenses:			
Conducting transportation	$438,902	$387,486	+13.3
Maintenance	198,379	206,785	— 4.1
General expenses	95,561	94,902	+ 0.7
Total operating expenses	$732,842	$689,174	+ 6.3
Net revenue railway operatins	$216,094	$193,492	+11.7
Taxes assignable to railway operations	46,601	58,087	—19.8
Gross income	$169,493	$135,405	+25.2
Interest on funded and floating debt	140,005	128,474	+ 9.0
Net income transferred to profit and loss	$29,488	$6,931	+325.0

STATISTICAL INFORMATION BOSTON & WORCESTER RAILWAY

Year Ended Dec. 31:	1919	1918	Percentage Change Over 1918
Total revenue car-miles	1,835,974	1,929,616	— 4.3
Total revenue car-hours	138,040	134,357	+ 2.7
Ratio C.M. to C.H. (speed m.p.h.)	13.3	14.3	— 7.0
Operating ratio (per cent)	77.2	78.2	— 1.3
Statistics per car-mile:			
Operating revenue (cents)	51.7	45.8	+12.9
Operating expenses (cents)	39.9	35.7	+11.8
Revenue from transportation (cents)	50.8	45.1	+12.6
Net income (cents)	1.6	0.36	+345.0
Statistics per car-hour:			
Operating revenue	$6.87	$6.57	+ 4.6
Operating expenses	$5.31	$5.13	+ 3.5
Revenue from transportation	6.77	6.47	+ 4.6
Net income (cents)	21.4	5.16	+315.3

Receivership Hearing Postponed

The hearing set to be held before the Federal Court in Kansas City, Mo., on Sept. 30, on the matter of the appointment of a permanent receiver for the Kansas City Railways was postponed to Oct. 14. Frank C. Niles was appointed temporary receiver on Sept. 9.

Reorganization Without Foreclosure Planned

The situation with respect to the Washington, Alexandria & Mount Vernon Railway and the affiliated Washington, Arlington & Falls Church Railway is explained in letters addressed to the holders of the $2,370,000 of outstanding first mortgage bonds of the former company, and the $1,000,000 first mortgage and $250,000 second mortgage bonds of the latter company. On account of the accumulation of floating debt which the company has been unable to finance without aid, the property requires about $250,000 to meet its overdue interest and maturities. A protective committee has agreed to advance the necessary funds subject to an audit now being made and when the stock of the company is deposited under an agreement giving the committee control of the management.

It is hoped to avoid foreclosure and to readjust the company's finances without the expense, delay and legalities which would be required by receivership. Following the bonds there is an issue of $2,000,000 of secured gold notes. These notes are held by banks, trust companies and other strong financial institutions. The protective committee of noteholders is headed by Howard S. Graham of Graham, Parsons & Company, as chairman. It is proposed that Mr. Graham shall succeed Norman Grey as president, the latter to become vice-president, and that the committee shall also name a secretary and treasurer and other officers.

The committee stipulates that 90 per cent of the outstanding stock shall be deposited before Sept. 24 with the Guarantee Trust & Safe Deposit Company, Philadelphia, under the terms of an option agreement under which the committee will have the right within two years from the date of the agreement to purchase the entire deposited stock at the rate of $10 per share for the preferred stock and $2.50 a share for the common stock. The agreement also provides that the depositary shall vote the deposited stock from time to time as the committee may direct.

Illinois Utilities Use Large Display Space

An advertisement of the Illinois Committee on Public Utility Information, used in half-page and quarter-page size, is now running in the Chicago newspapers and some of the larger papers in northern Illinois. It has been placed and is being paid for by some of the Chicago companies. The object is to stimulate public interest in the securities of the utilities of the State by calling attention to the tremendous number of persons who hold such securities. This effort is regarded as quite important, as the wider the circulation of this information the greater the good to the industry as a whole.

Financial News Notes

Certificate of Capital Increase Filed.—The Manila Electric Railroad & Light Company has filed a certificate with the Secretary of State at Trenton, N. J., increasing its capital from $3,000,000 to $5,000,000. The company operates an electric railway system and furnishes power and light in Manila and other parts of the Philippine Islands.

Milwaukee Issues Equipment Trusts.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has sold an issue of $1,090,000 ten-year 8 per cent sinking fund equipment trust gold certificates at par and interest through W. A. Read & Company. The notes are dated Oct. 1, 1920, and are issued under the Philadelphia plan against 139 new standard steel cars.

Receiver for Pennsylvania-Ohio Road.—The Cleveland & Erie Railway, Girard, Pa., operating between Conneaut, Ohio, and Erie, Pa., has been placed in the hands of a receiver, following proceedings in equity brought by George Bullock, receiver of the Buffalo & Lake Erie Traction Company. Failure to pay interest on bonds due on July 1 and $2,489,230 alleged to be due the local traction company for the use of its lines in the city of Erie are charged in the bill of equity.

Toledo Company Reimbursed.—From the Craig fund, authorized by federal court to provide for improvements to service of the Toledo Railways & Light Company, Toledo, Ohio, Judge Killits ordered $14,377 to be paid over to the company to reimburse it for repairs to tracks and equipment. This sum was additional to amount being expended in double tracking a part of Stickney Avenue and a part of it is being used to remodel cars and paint them. The fund is formed by payment of 6 per cent of the net earnings of the company weekly into the hands of an officer of Federal court. It was created to take care of a fraction of a cent raise in fare at a railway settlement several years ago.

Interurban Entrance Agreement Reached.—The City Council of Reno, Nev., has accepted the terms under which the Nevada Interurban Company has asked to be allowed to operate cars over the line of the Reno Traction Company from Reno Avenue to Second Street. Under this proposal the Nevada Interurban Company will pay $1,200 to the city, which will cover the cost of construction and repair work from California Avenue to Second Street. The Reno Traction Company will maintain the track from California Avenue to Reno Avenue, the city to do the paving on each side. Estimates furnished the City Council by City Engineer Chism would appear that it will cost the city near $20,000 for the reconstruction work.

Shuttle Service on Staten Island.—On the afternoon of Sept. 18 the receiver of the Richmond Light & Railroad Company commenced operating cars on the tracks of the Staten Island Midland Railway, which had been idle since last January. The operation was directed on Sept. 16 by the United States District Court, having jurisdiction in the matter of the receiverships, and is being carried on under contract arrangements between the receiver of the Midland company and the receiver of the Richmond company pursuant to instructions of the court. A shuttle car service is provided on different parts of the lines, each to be operated for a 5-cent fare. Through operation for a 5-cent fare to or from St. George, the focus of the main transportation routes of the Borough of Richmond, is discontinued by the court.

Oil Earnings Diverted to Utilities.—So far as the St. Joseph Railway, Light, Heat & Power Company, St. Joseph, Mo., is concerned that property will be left to its own financial resources, according to F. C. Hamilton, testifying for the Doherty interests, which control the property, at the hearing before the Missouri Public Service Commission for an increase in fare from 7 cents to 10 cents. Mr. Hamilton is quoted as follows: "The public utilities could not get along unless they were helped from the oil earnings of the Doherty interests. The investment in the utilities is 35 to 40 per cent more than in oil, but the earnings of the public utilities are about one-sixteenth of the earnings of the oil business. The Dohertys have lost so much on their utilities that, in the future, unless they change their mind, they will decline to finance the utilities out of the oil earnings, and the utilities will have to stand on their own feet."

Cash Used to Take Up Certificates.—An order permitting Receiver Rolla Wells of the United Railways, St. Louis, Mo., to use $2,300,000 of the general funds of the company in order to retire the first issue of receiver's certificates has been issued by Judge Faris in the United States District Court at St. Louis. The issue of certificates was made Sept. 2, 1919, and bore 6 per cent interest. It was the original plan to sell a second issue of $4,200,000 of certificates and with the proceeds pay off the first issue and take care of some underlying bonds. Bids on the second issue, however, were all so low that none could be advantageously accepted. These certificates bear 7 per cent interest and run for three years. The stipulation in the issuance of the first certificates that if they were not paid at maturity they were to bear 8 per cent interest caused Receiver Wells to seek the court order. A representative of the company said that no effort would be made to market the second issue of certificates until the money market became more favorable.

Traffic and Transportation

States' Power at Issue

Utilities Commissions Take Action to Preserve Their Authority Over Intrastate Rates

The Public Service Commissions of a number of States have taken steps to prevent steam roads and electric interurbans from establishing for intrastate traffic the percentages of increase in freight and passenger rates recently allowed by the Interstate Commerce Commission. The National Association of Railway and Utilities Commissioners at a meeting in Chicago on Sept. 11 appointed a committee to follow all litigation in which carriers attempt to secure an interpretation of the Esch-Cummins act, "which will diminish the powers of the States to control intrastate rates and regulations of carriers."

WOULD SAFEGUARD RIGHTS

The commissions which have refused to allow the roads to install either in whole or in part the rates authorized by the Federal commission take the stand that if the efforts of the carriers are successful in the proceedings that have been instituted before the Interstate Commerce Commission they will have succeeded in stripping the state commissioners of all effective powers over state rates. Their position is outlined in a letter recently addressed by the association's committee to all state commissions. This communication reads in part as follows:

> The situation is serious. The state commissioners generally have allowed freight rate advances upon intrastate traffic corresponding to the advances allowed upon interstate traffic by the Federal commission. The Illinois commission has, however, allowed 33⅓ per cent, the Texas commission the same per cent and the Nebraska commission 25 per cent. Several commissions have restricted the advances on particular commodities. In states where passenger fares are limited by statutes they have refused to sanction the proposed passenger advance. . . .
>
> At the hearing in Chicago before the Federal commission in the Illinois Shreveport case no other evidence of discrimination was offered by the carriers than that the Illinois commission had allowed a less percentage of increase than the Federal commission. The carriers have chosen to rest upon the proposition that whatever action the Federal commission takes as to interstate rates must be also taken by every state as to intrastate rates, without consideration of the question of the reasonableness of the same as to state traffic, and even though it may be destructive to such traffic.
>
> Upon this proposition it was the unanimous opinion of the conference that we have no alternative but to fight. If the transportation act is correctly interpreted it does not strip the state commissions of all power over state rates, but carefully preserves the same. We owe it to the people of our respective states to defend our present powers against destruction by any such misconception of the transportation act as carriers are now attempting to give. We should do this first before the Federal commission, and then in court, if need be.

Sixteen state commissions have so far made authorizations in general accord with the Federal commission. The states where this action has been taken are California, Colorado, Florida, Georgia, Maryland, Massachusetts, Michigan, Missouri, New Hampshire, New Jersey, Oregon, Pennsylvania, Rhode Island, Vermont, Virginia and Wyoming. The Idaho and Washington state commissions have authorized the freight and passenger advances, with the stipulation that no passenger fare as increased shall exceed 3.6 cents per mile.

Commissions which have allowed the full freight increase but have denied or postponed action on passenger rates under statutory limitations include Indiana, Iowa, Minnesota, Montana, New York, Ohio, South Carolina, West Virginia, and Wisconsin. The South Dakota commission allowed increases corresponding to those of the Federal commission, with the exception of advances in commodity rates. The commission of Illinois and Texas authorized freight advances of 33⅓ per cent, but denied the passenger increases under state laws.

Regulation of Jitneys Urged

According to an opinion of the State Department of Public Utilities, a continuation of jitney service in competition with the street railways of Massachusetts cannot long exist without disaster to one or both. The department's opinion is that, with the elimination of jitney competition, there "is every reason to believe" that the street railways alone would be able to render cheaper and better service than the railways and jitneys now furnish together.

The theory is advanced that the failure of Massachusetts to keep pace with the rest of the country in subjecting jitneys to reasonable and proper regulations is responsible for the jitney problem in that State assuming a more acute phase, perhaps, than in any other part of the country.

It is significant that practically all of the states and cities where the volume of jitney business has been largest in the past have found it necessary to adopt stringent regulations which have resulted in decreasing the number of jitneys to a point where their operation no longer constitutes a serious menace to existing transportation agencies or to the public. The 1918 statute represents an attempt, in part at least, to bring the Massachusetts policy into line with legislative precedents in other states.

The commission finds that a candid investigation of the conditions of jitney operation wherever it has been tried is bound to lead to the conclusion that while jitney service may supplement or destroy the street railway, it cannot take its place.

Railway Rests Its Case

Los Angeles Company Presents Reasons for Asking a Rate Increase at Commission Hearing

The application of the Los Angeles (Cal.) Railway for an increase in its rate of fare was presented to the California Railroad Commission at a hearing on Sept. 20. The City Attorney of Los Angeles was granted three weeks in which to examine statistics submitted by the corporation and to file a brief. The decision of the commission will be made without another hearing.

G. J. Kuhrts, general manager of the Los Angeles Railway, testified that $5,000,000 would be needed for investment in 1921. He declared that $1,393,000 would be needed for new cars, seventy of the standard type and sixty-two of the one-man safety type. The present valuation of the company was given as $41,083,864. The deficit on June 30, 1920, was stated to be $893,083.

A 27 per cent advance in power costs and wage increases amounting to $990,000 a year were given as the chief items of increase in operating costs experienced by the railway.

The possibility of jitney competition reappearing in Los Angeles after being stopped by a city ordinance was injected into the hearing by Jesse Stephens, Assistant City Attorney. Mr. Kuhrts said that he believed the public would resist any such move owing to the present traffic situation.

SPECIFIC RATE NOT ASKED

Mr. Kuhrts contended that an increase of from 20 to 30 per cent in fare would be necessary for the Los Angeles lines. No specific rate was mentioned. The Los Angeles Railway now charges a 5-cent fare. The Pacific Electric Railway was recently granted a 6-cent fare for local travel as a temporary measure.

Patrons of the company questioned Richard Sachse, chief engineer of the commission, on the practicability of one-man car operation and the advisability of extending this service. Mr. Sachse spake emphatically in favor of the safety car and advocated extension of the local service, as recommended in his report following the survey which led up to the recent rerouting of the Los Angeles Railway system.

Whether the Los Angeles Railway would receive 20 per cent more in revenue through a 20 per cent fare increase was discussed extensively. Bruce Campbell, assistant engineer of the commission, estimated that such a rate advance would produce a 17⅜ per cent increase in revenue and predicted a 5 per cent increase from additional traffic resulting from the expected growth in population.

One of the witnesses urged the adoption of a co-operative plan whereby non-rush-hour riders should be given rebate slips to be redeemed by local merchants. This scheme, he contended, would benefit trade as well as stimulate traffic.

50 per Cent More Riders

Co-operation Between Railway Management and Public Accomplishes Tangible Results in Fall River

Everybody is smiling in Fall River, Mass., these days. Everybody, that is, who comes in contact with the local electric railway system. The men who run the cars are happy because they have been given an increase in wages of 11 cents an hour. The people who ride the cars are pleased because theirs is the only community served by the Eastern Massachusetts Street Railway to escape the recent increase in fare. But the "joyfulest" person of all is A. J. Boardman, manager of the Fall River Division of the Bay State system. The reason why Mr. Boardman is especially gleeful and, incidentally, why there is so much smiling in Fall River just now is this: During the past twelve months traffic on the local electric railway lines has increased by 50 per cent.

IN JULY, 1919, there were 800,000 riders on the lines of the Fall River Division. In July, 1920, there were 1,200,000, an increase of 400,000 passengers. Last July the Fall River district netted a profit of $29,715. During the same period all the other divisions failed even to earn their cost of service. Because of this showing, the public trustees of the system announced that Fall River alone would be exempted from the recent advance in rates.

CO-OPERATION RESPONSIBLE

Co-operation between the railway management and the public has been mainly responsible for this growth in riding. Fall River, to a man, woman and child, "boosts" for the trolleys. The members of the Chamber of Commerce, the American Legion and the Ladies' Aid Society of the First Methodist Church are trolley "fans." James Tansey, president of the Fall River Textile Council and chairman of the home rule committee of the Fall River Division, has this to say of the situation:

> A street-car line must have passengers to make any profit. If the riders get a grudge and walk, or use other means of transportation, the street railway has simply got to run at a loss. The reason we are making a profit is because we have the confidence of the citizens, and by that means have got them to use the trolley in increasing numbers. The credit for accomplishing this belongs to all concerned. The Chamber of Commerce took the initiative in promoting co-operation; the home rule committee gave faithful service; the newspapers urged the people to "boost, not knock," and the Eastern Massachusetts trustees have kept faith in every particular.

It all began about a year ago. At that time the fare was 10 cents straight. Sidewalk and jitney competition was increasing by leaps and bounds. Car riding had been reduced to a "must" proposition—one "must" pay 10 cents only if one "must" ride. Then of a sudden there came a change. The Chamber of Commerce launched an educational campaign. It showed the people that they could not get along without trolley service. The public was quick to respond. "Take the trolley" became the city's slogan.

"HOME RULE" POLICY WINS

The railway management met the people half way. In September, 1919, the trustees made Fall River a separate operating district under the control of a home rule committee, nominated by the Mayor and appointed by the trustees. This committee has complete supervision of the territory, except for the setting of fare rates. At the same time the trustees established a workmen's ticket giving fifty rides for $3. Later the rate was further reduced by the introduction of a ticket giving sixteen rides for $1. The people have forgotten that the cash fare is still 10 cents. Every one uses tickets.

Charles J. Leary, managing editor of the Fall River *Daily Globe*, stated recently that whereas complaints against the railway used to pour into his office each day, he had not received a complaint now for months. Said Mr. Leary:

> We used to "knock" as hard as anybody. But now that the public and the company are working for each other there is no need for it. Though we helped out in the co-operative campaign, we don't intend to suppress complaints. The reason we don't print them is because we don't have them, strange as it may seem.

Among the most ardent workers for the railway is Charles M. Ketchum, secretary of the Chamber of Commerce. Mr. Ketchum summed up the situation as follows:

> The whole thing started with the movement for better streets. We needed road improvement, but also needed the financial help of the Bay State on the streets where it had lines. As it was only just managing to cover expenses and could spare no money the question boiled down to making the street cars pay. . . .
>
> Increased revenue has enabled the Bay State to provide new cars and better service. It has helped the city in its street improvements and is planning more, which have been temporarily held up by the recent wage award.
>
> The Bay State got its money; we got our road improvements, and now the people have got exemption from the most recent fare rise. It is a clear illustration that it is increase in number of passengers which makes a road pay, and it is because the people feel that the road is really run for them that they ride in ever-increasing numbers.

Ask Aid for Hartford Trolleys

Indorsing the report of its special transportation committee, the board of directors of the Chamber of Commerce of Hartford, Conn., on Sept. 28 appealed to the city authorities to suppress jitney competition with the local lines of the Connecticut Company. The committee's report, in addition to urging stringent regulation of the buses, suggested that the Chamber of Commerce petition the State Public Utilities Commission to grant the company an adequate rate of fare. The report follows:

> Based upon the investigation and findings of the Public Utilities Commission, the special legislative committee, the Federal Electric Railways Commission, as well as from local observation, and reports from other cities, also conference with representative of the jitney association and conference with representative of the Connecticut Company, your committee finds, and calls attention to, the following facts:
>
> 1. Under the present condition of operation the revenues of the Connecticut Company do not equal the expenses of operation.
> 2. Service has been maintained to date by the omission of payment of taxes and other lawful charges imposed by the state and city, and by omitting and postponing all but the most urgent maintenance work.
> 3. Such financial condition unless remedied must inevitably result in bankruptcy and cessation of service.
> 4. Under present conditions it is probable that with the increased expense of winter operation a general suspension of service on many suburban lines must occur, possibly extending as well to the poorest paying city lines.
> 5. Under present conditions the possibility of total abandonment of service must be faced in the near future.
> 6. Under present conditions trolley transportation cannot be self-supporting in competition with individual and unregulated bus competition of a material magnitude.
> 7. The continued operation of trolley transportation is of vital importance to the city, as the transportation of the public cannot at present be handled by any other means now available.
> 8. The city would be greatly benefited by systematic bus transportation in those territories not now served by trolley lines.
> 9. The present bus service is popular as shown by the patronage, and is more rapid than can be furnished by trolley service.
>
> In view of the above facts your committee recommends:
>
> 1. That the Chamber of Commerce urge the city authorities to make such suitable regulations as will eliminate the present bus competition in the sections of the city served by the trolley. Such regulations should not, however, discourage the operation of suitably regulated and responsible bus service lines in sections not now served by the trolley.
> 2. That the Chamber of Commerce urge that the Connecticut Company should obtain the necessary permission from the Public Utilities Commission for such rate of fare as will give sufficient revenue to rehabilitate its credit, and enable it to give an improved and proper service to which the community is entitled.

Advertise for Traffic

In an effort to assist the Cincinnati (Ohio) Traction Company in increasing business and getting people into the car riding habit, William C. Culkins, City Street Railway Director, on Sept. 14 suggested several ways of increasing traffic. Some of the suggestions offered by Mr. Culkins, which are already being put into practice by the railway, follow:

Induce passengers and their friends using the railroad depots to use street cars by adopting schedules closely adapted to the arrival of trains.

Operate a better type of car to the Central Union Depot.

Place a representative of the company at the station and use advertising matter and signs judiciously.

Advertise the baseball games attractively and legibly, and reclaim for the street cars many persons who now use taxicabs.

Remodel cars with longitudinal seats to cars with cross seats.

Mr. Culkins further suggests that advertising matter in hotels and newspapers explaining the possibilities of attractive scenery would be money well spent in the interest of the car rider. He commented on what appears to have been the policy of the company in recent years to discourage the use of chartered cars. He added that co-operation with the convention and publicity bureau of the Chamber of Commerce could be had and special routes laid out in accordance with the particular interests of the convention to be served.

In Cincinnati some factories are "trucking" employees direct between their homes and the factory. Mr. Culkins holds that this traffic could be better served by the use of the street cars in instances where the patronage would warrant.

May Reopen Portland Case

The Oregon Public Service Commission is justified in reopening the case of the Portland Railway, Light & Power Company, Portland, with a view to relieving the company of heavy franchise charges, according to a ruling recently issued by the State Attorney General. A group of Portland citizens some time ago petitioned the commission for a hearing on the question of reducing these charges, which they contended made necessary the recent increase in fare by the company from 6 cents to 8 cents. The commission asked the Attorney General for an opinion on the case.

On March 27 last the commission found that the provisions of the franchise relating to taxes, car licenses, free transportation of city employees, paving assessments and bridge assessments were unreasonable and amounted to double taxation. The commission recommended that the city of Portland eliminate these alleged unjust burdens. On May 21 the proposal was referred to the voters at a referendum election and was defeated. The commission then authorized the company to raise its fare.

Connecticut Freight Rates Up

The Connecticut Public Utilities Commission on Sept. 29 authorized the Connecticut Company, New Haven, to increase its freight rates 40 per cent. The matter came before the commission on Aug. 23 in the form of a petition from the company. The commission held a hearing on the petition on Sept. 16. The order of the commission follows in part:

> The wage scale for the employees of the company engaged directly in the freight and express department shows the following increases over wages paid when the present rates were established in September, 1918: Motormen, 56.81 per cent; messengers, 46.66 per cent; freight handlers, 42.85 per cent, or an average wage increase of 48.77 per cent.
>
> The petitioner asks for an increase of 40 per cent over its present rates. In a recent decision by the Interstate Commerce Commission granting a 40 per cent increase in the freight rates of the New York, New Haven & Hartford R.R. and other steam railroads it stated relative to electric lines that the operating costs of these lines have on the whole increased approximately in the same ratio as those of steam railroads. In some instances there is competition between the electric lines and the steam railroads. We conclude that the freight rates of the electric lines may be increased by the same percentages as are approved herein by the trunk lines in the same territory.
>
> It is problematical as to whether a 25 per cent increase would produce more revenue than the proposed 40 per cent on the assumption that the latter increase on account of substantially higher rates would drive away business. Even with the retention of the present volume of business, a 40 per cent increase would not produce sufficient revenue to pay a 6 per cent return on the capital directly invested in and allocated to the freight and express business.

Riders Back P. R. T.

400,000 Philadelphians Express Their Approval of Mitten Fare Plans—Mayor Outlines City's Attitude

Patrons of the Philadelphia Rapid Transit Company to the number of 476,027 have given their written indorsement of the work accomplished by the Mitten management in the interest of efficient service. Announcement to this effect was made on Sept. 27 at a hearing before the transportation committee of the City Council, when the company made public the results of a canvass on the question of the abolition of transfers. As tangible evidence of the public's attitude, a delegation of P. R. T. employees produced fourteen wash hampers heaped with signed referendum cards.

CO-OPERATIVE EFFORT

TO THE CAR RIDER:

Up to 1911 street-car strikes in Philadelphia greatly disturbed the car-rider, and caused enormous loss to the community.

Co-operation, under present management, has put a stop to all this, and every car-rider should be deeply interested in helping to prevent a return to bad street railway conditions, as they used to be in Philadelphia, and still are in other cities.

Instead of having strikes and interrupted car service during the war, co-operation, between the Men and Management of P. R. T., secured such settled conditions made it possible for Philadelphia to get more than its share of war contracts. The contracts provided plenty of employment at high wages, made money plentiful and benefited everybody—except P. R. T.

Pittsburgh is now permitted to charge a 10-cent fare, and this would have been necessary here, except for the good work of this Management and its Men.

P. R. T. was refused permission to make a general 3-cent charge for transfers last July, so that P. R. T. is growing daily deeper in debt.

P. R. T. must have more money now—immediately—to pay its wages and other increased costs, and provide better service for the coming winter.

A straight 5-cent fare, without transfers or exchanges, will save the Management at this time, but if permission is not granted now, an 8-cent flat fare at least will be later required to keep the cars running.

The Men and Management believe that they have earned your confidence and consideration, and appeal to you, in a spirit of fair play, to express yourself as being now willing to pay the straight 5-cent fare, which is necessary to a continuation of the present Management.

T. E. MITTEN, *President.*

PLEASE DETACH HERE,

SIGN AND HAND TO CONDUCTOR

P. R. T.'s Men and Management ask YOUR endorsement of the work they have done, by signing your name hereon, requesting that the Mayor, City Council and Public Service Commission consent to P. R. T. now collecting a straight 5-cent fare, without transfers or exchanges. (This is a temporary measure, pending completion of valuation.)

(Sign here) ....

(Address) ....

SEPT., 1920.

REFERENDUM CARD USED BY P. R. T.

Mayor J. Hampton Moore, principal witness at the hearing, declared that unless the company obtained an increase in revenue it would face bankruptcy. The Mayor refused to take a definite stand on the question of permitting the company to install a straight 5-cent fare. He placed responsibility for any alteration of the 1907 agreement between the city and the P. R. T. squarely on the shoulders of the Councilmen.

Mayor Moore declared that even if the company were wiped out by bankruptcy the fare problem would remain. In outlining his position he said:

> The statement given to the board of directors for the eight months ended Aug. 31 last shows the amount by which the gross revenues of the company are insufficient to provide for operating expenses, taxes, fixed charges and the 5 per cent return upon P. R. T. stock to be $1,151,628.77. It is freely stated—stated I think at your last meeting by one more qualified to speak of its affairs than myself—that the company must have more revenue before December, or face failure. . . .
>
> It is admitted that the company has no credit. It cannot borrow money. It cannot make extensions, so it is represented to the Mayor—and he has asked for many which the city desires—because it has not the funds with which to make extensions. It has retained the good will, however, of its thousands of employees by increasing or keeping wages up to meet the increasing cost of living, and it is unthinkable that faith should not be kept with those employees, particularly while the high cost of living continues.
>
> As to rentals paid to the underlying companies, or an increase in fares for services rendered to the public, either or both of these questions must await the determination of the Public Service Commission, based on a valuation of the property of the Philadelphia Rapid Transit and the underlying companies. . . .
>
> Therefore, whatever the Council may do with respect to the pending ordinance will be in the nature of a temporary recourse, to apply only and until the Public Service Commission, with the valuation of the property in hand, shall decide what is a just and compensatory rate of fare and what is a just and reasonable rental.

Business Men Ask Lower Fares

L. D. Pellissier, president of the Holyoke (Mass.) Street Railway, has received from the president of the local Chamber of Commerce a letter asking that the railway take immediate steps to improve service and possibly to reduce its fare. The letter states that the Holyoke business men feel that the carmen should not receive a further increase in wages which would lead to a still higher rate. The company is also asked to abolish the zone fare system under which it is now operating. Under the present plan the city of Holyoke is divided into two districts, in each of which a 6-cent fare is charged, the fare for a ride across the city being 12 cents. The company's employees, who are now receiving 55 cents an hour, are demanding a further increase in wages.

The railway has not been on a profitable basis since it stopped paying dividends three years ago. An attempt to recover the loss by adopting a zone system failed of its purpose and a modification with a 7-cent fare was next made. Under the 7-cent fare the company was able to accumulate a surplus of $33,000. The men then demanded higher wages and secured retroactive concessions that not only wiped out the $33,000 surplus, but resulted in a considerable deficit. The company then adjusted the present fare plan. The men now demand $7 for an eight-hour day, with one day off in fifteen with pay.

Ten Cents in New London

Lucius S. Storrs, president of the Connecticut Company, New Haven, Conn., announced on Sept. 29 that a 10-cent cash fare would be placed in effect on the New London city lines on Oct. 15. The New London Division, formerly a part of the Shore Line Electric Railway, is now being operated by the Connecticut Company.

The announcement that a 10-cent fare will be charged in New London is taken by many persons in Connecticut to indicate that the company plans to apply for a 10-cent fare throughout its system. The State Public Utilities Commission, at the time of granting the railway temporary increase in fare to 7 cents, announced that it would later hold a hearing for the purpose of fixing a permanent rate. This hearing before the commission was scheduled to take place on Oct. 1.

Transportation News Notes

Six-Cent Fare in Marion.—The City Council of Marion, Ohio, has passed an ordinance granting the Columbus, Delaware & Marion Electric Company, Columbus, a 6-cent cash fare with five tickets for 25 cents on its lines in Marion. The fare has been 5 cents.

Zone Fares 7 Cents.—The Chester & Derry Railroad, Chester, N. H., has raised its fare in each zone to 7 cents. The increase was authorized by the State Public Service Commission and became effective on Aug. 16. The company operates a line 8 miles long between Chester and Derry.

Fare Raised in Lima.—A 7-cent cash fare went into effect on Sept. 3 on the Lima, Ohio, lines of the Ohio Electric Railway. The fare was formerly 5 cents. Nine tickets are sold for 50 cents in place of six for 25 cents. Children are carried for 4 cents or two for one adult fare.

Seven Cents in Bangor.—The Maine Public Utilities Commission has issued an order authorizing the Bangor Railway & Electric Company, Bangor, to put into effect on one day's notice a new schedule of fares with a basic rate of 7 cents. The fare has been 6 cents. The company some time ago applied to the commission for authority to charge an 8-cent fare.

Ten-Cent Fare in Marshall.—The Marshall (Texas) Traction Company on Sept. 20 installed a 10-cent fare on its lines in Marshall. The company was recently granted authority to increase its fares from 5 cents to 7 cents. It now asserts that increased cost of operation makes the 7-cent fare entirely too low, and that it cannot operate longer on that basis.

Towns Ask Fare Cut.—At a conference of the city and town officials of Beverly, Salem, Peabody, Marblehead, Danvers, Wenham and Hamilton, Mass., on Sept. 25, it was voted to appoint a committee to confer with the trustees of the Eastern Massachusetts Street Railway with a view to the elimination of double fares within a single city or town. The restoration of the transfer privilege is also to be asked for by the municipalities.

Ten Cents Asked in Missoula.—The Missoula, (Mont.) Street Railway has filed with the Montana Public Service Commission a petition for authority to charge a 10-cent cash fare on its city lines. The company proposes to sell four tickets for 30 cents. The fare was raised from 5 cents to 6 cents two years ago. It is proposed to continue the issuance of free transfers. The railway also seeks to raise the rate on its suburban lines.

Fares Raised on Interurban.—Passenger fares on the line of the Lackawanna & Wyoming Valley Railroad, Scranton, Pa., have been raised 20 per cent. The company has raised its commutation rates 10 per cent. Freight rates have been advanced 40 per cent, as recommended by the Interstate Commerce Commission. The company's passenger fares are now on the basis of 3 cents a mile, mileage books on one of 2¼ cents a mile and commutation books on one of 1½ cents a mile.

Lower Fares for Brockton.—At the request of Mayor William L. Gleason of Brockton, Mass., the public trustees of the Eastern Massachusetts Street Railway have promised to reduce the present fare rates in that city by introducing a limited $4 commutation ticket good for three zone rides, to be used within two weeks. The purpose will be to aid those who live outside Brockton, particularly working people, to get into the city and home again at reduced rates.

Needs More in Sacramento.—The Pacific Gas & Electric Company, Sacramento, Cal., has notified the Sacramento City Commission of its intention to apply to the State Railroad Commission for authority to raise its fare. The company asks that the city take no action looking to the revoking of jitney restrictions pending action on its application. The company's local lines earned only 2.5 per cent, or $56,742, for the year ended June 30, 1920. The company recently curtailed its service owing to a shortage of power.

Ten-Cent Fare Asked on Suburban Lines.—The Connecticut Public Utilities Commission on Sept. 21 held a hearing on an application of the Waterbury & Milldale Tramway, Waterbury, for permission to raise its fare to 10 cents. John H. Cassidy, general manager of the company, stated that even at a 10-cent fare the company would not make ends meet. Daily expenses are $355, while the receipts approximate $283. The company has paid no dividends in some time. It owes $15,000 interest on its bonds.

City Fights Higher Fares.—The city of Winnepeg, Man., has begun an action in the provincial court looking to a reversal of the order of the Manitoba Public Utilities Commission granting the Winnipeg Electric Railway permission to charge a 7-cent fare. Under the order of the commission the company raised its rate from 6 cents to 7 cents on Sept. 1. In attacking the commission's action, the city alleges that the former has no power to interfere with a contract between a utility and a municipality.

Asks More in Alton.—W. H. Sawyer and F. E. Allen, receivers for the Alton, Granite & St. Louis Traction Company, Alton, Ill., have applied to the Illinois Public Utilities Commission for an increase in the company's fare to 10 cents. The petition asked that the new rate be made effective on Sept. 30. The present fare in Alton is 8 cents with two for 15 cents and seven for 50 cents. The receiver recently replied to a demand for a wage increase from the carmen that they would be willing to pay 6 cents an hour more if a higher fare was granted.

Motor Stages Opposed.—Protest has been filed with the Utah Public Utilities Commission by the Bamberger Electric Railroad, Salt Lake City, against the granting of a permit for a motor passenger and freight line between Farmington and Salt Lake City. The company states in its protest that it has been giving the public a daily service for the last ten years, that one of its taxable holdings is a franchise, assessed to be worth $75,000, which will be injured if the stage line is permitted to run, and that the auto stage will use the state highway, a cement road, which the taxes paid by the Bamberger line have helped to make and to keep in a state of repair.

Eight Cents Cash in Durham.—Cash fares on the city lines of the Durham (N. C.) Traction Company were raised from 7 cents to 8 cents on Sept. 5. The price of tickets in strips of four was advanced on the same date from 25 cents to 30 cents. The increases were made by authority of the State Corporation Commission. The company had applied to the commission for a 10-cent fare, asserting that during the past year it operated its railway department at a loss of more than $61,000. Granting of the company's petition was opposed by the city, which contended that the company was operating its other departments at a profit.

Auditors Justify Fare Increase.—After an examination of the books of the Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa, the firm of Billings, Prouty & Tompkins, auditors, has announced that the company was justified in raising its fare from 6 cents to 8 cents. The railway installed the new rate about a month ago, contending that it could no longer continue to operate at a 6-cent fare. The auditors find that an 8-cent fare will produce revenue in excess of the company's operating costs, including depreciation, without making allowance, however, for the reduction by the imposition of Federal income taxes.

Seven-Cent Fare Approved.—The City Council of Texarkana, Texas, has passed an ordinance granting the local electric railway an increase in fare from 5 cents to 7 cents for adults and from 3 cents to 4 cents for children under twelve years of age. This action was taken after a petition had been presented by the Southwestern Gas & Electric Company, which operates the local traction system, and after the City Council of Texarkana, Ark., had granted the increase. Neither ordinance embodied the full requests of the traction company, and the company has not indicated whether it will accept the franchises.

Ten Cents in Paducah.—Alfred Nichols, manager of the Paducah (Ky.) Railway, recently notified the Board of City Commissioners that the company would raise its fare to 10 cents on Oct. 1. Mr. Nichols announced that in case the city opposed the rate increase the company would take the case to the Federal courts for judication. The company has been operating under a service-at-cost franchise and at a 6-cent fare. In notifying the commissioners of the intention to raise fares Mr. Nichols stated that since Jan. 1, the railway had sustained a loss of $70,000. The City Commission has passed an ordinance forbidding the company to raise its rates until the need for an increase has been investigated.

Commission's Power Questioned.—The Delta Light & Traction Company, Greenville, Miss., has brought suit in the Circuit Court against the Mississippi Railroad Commission to determine whether the commission has the power to forbid the company to abandon operation of its railway lines. Several months ago the company applied to the commission for permission to abandon its lines, comprising approximately 7 miles of track. The commission refused this request, but authorized the company to charge a fare of 10 cents. The company contends that it can abandon service at will without incurring any penalty other than forfeiture of the railway portion of its franchise and that its electric lighting franchise remains intact.

Skip-Stop for Golden Gate.—Shortage of hydro-electric power throughout northern and central California has caused the skip-stop system to be revived on the electric railways of San Francisco. H. S. Butler, State Power Administrator, recently issued an order calling for the curtailment of power consumption by public utilities as well as by private corporations. Under the terms of this order both the United Railroads and the Municipal Railway of San Francisco installed the skip stop on Sept. 20. It is estimated that the saving in power under the new arrangement will approximate 8 per cent. Several other traction companies in the northern part of the state have adopted similar measures. The Pacific Gas & Electric Company, Sacramento, recently reduced its service approximately 20 per cent.

Fare Increase Alternative to Shutdown.—Fares on the local electric railway in Attleboro, Mass., have been raised from 5 cents to 6 cents by authority of the State Department of Public Utilities. The Interstate Consolidated Street Railway, operating the Attleboro lines, recently applied for permission to raise its fare, stating that unless the rate was increased it would have to abandon operation. Service is now being furnished at a loss estimated at $3,000 a month. A year ago the company's line was divided into zones and the fare was raised to 7 cents. Two months ago the zones were shortened and the fare was reduced to 5 cents. Traffic has fallen off during the summer, owing to the fact that the company abandoned the use of open cars, thus losing the patronage of many riders.

City to Operate Lines.—The Board of Estimate and Apportionment of New York City has revoked the franchises of the Richmond Light & Railroad, operating electric railway lines in Richmond Borough, because of the failure of the company to operate its lines continuously. The railway is now operating cars on all of its lines at an 8-cent fare and will continue to do so under a court injunction, prohibiting interference with it. The city is expected to ask the court to withdraw the injunction so that it can prepare for the operation of municipal lines. Grover A. Whalen, commissioner of Plant and Structures, is completing arrangements for taking over on behalf of the city the lines of the Staten Island Midland Railway, also serving Richmond Borough. The company, which is in the hands of a receiver, suspended service last January on the plea that it could not pay expenses on a 5-cent fare. It recently resumed operation over a part of its lines.

Ten Cents on Penn Line.—The Public Service Commission of Pennsylvania has granted the application of the Waverly, Sayre & Athens Traction Company, Waverly, N. Y., for an increase in the cash fare on its lines in Pennsylvania to 10 cents. The company is required to sell thirty tickets for $2.40. The company is also given the right to abandon such parts of its line as are unremunerative. The Frankford, Tacony & Holmesburg Street Railway, Philadelphia, has filed with the commission a rate schedule under which it proposes to divide its lines into two zones, charging a 6-cent fare in each zone. The Southern Pennsylvania Traction Company, Chester, announced that beginning Sept. 19, the rates within the city limits and in each fare zone on all suburban lines would be increased from 7 cents to 8 cents. The Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio, has filed notice with the Pennsylvania Commission of an increase of fare from 5 to 10 cents between stations.

New Publications

Proceedings of Public Ownership Conference

Published by the Public Ownership League of America, Chicago, Ill.

This is the full report of the conference held in Chicago Nov. 15-17, 1919, the second conference of the kind. Among other subjects the report contains one on "The Street Car Problem and Its Solution," with contributions by Delos F. Wilcox, M. M. O'Shaughnessy, Hon. A. M. Todd, Thomas Murphine and Frank Ayers.

Calculating Diagrams for Design of Reinforced-Concrete Sections

By James Williamson, Constable & Company, Ltd., London, England.

Mr. Williamson's book is a collection of diagrams with examples to show their application, for use in the design of slabs, beams and columns under tension, compression and bending stresses. His purpose in publishing the book was to provide a convenient and quick means for calculation, eliminating danger of arithmetical error and complication of elaborate mathematical formulas.

Safe Storage of Coal

By H. H. Stock. Technical Paper No. 235, United States Bureau of Mines, Washington, D. C.

In view of the importance of its subject to electric railways this little pamphlet, which can be obtained free by addressing the bureau, should be in the hands of all railway men who are in any way responsible for continuity of coal supply. It is in the form of a catechism, is practical and contains a good bibliography of coal storage.

Personnel Administration

By Ordway Tead and Henry C. Metcalf. 53 pages, cloth, 5 x 9 in., McGraw-Hill Book Company. New York, N. Y.

This book is written to that newly developed field of personnel administrators and is useful both as a text in colleges and for other types of classes studying this question, as well as to men engaged in personnel administration or other phases of management of men, as reference to suggest new ideas.

Included in the book are admirable discussions of reasons for and functions of a personnel department, employment methods and provisions for both safety and training of workers and employees of all sorts. There are also suggested lines of study upon which improvement can be made, rewards to men and the larger problem of administrative relations and joint relations between the administration and the employees.

It is a book which should appeal to all those interested in the problem of handling men whether in large or small groups.

Personal Mention

M. J. Loftus, general superintendent of the Texas Electric Railway, Dallas, Tex., has been given the duties of superintendent of maintenance of way.

W. Clapper, general manager of the Inter-Urban Railway, Des Moines, Iowa, has resigned. Mr. Clapper became general manager last May. He was formerly traffic manager of the company.

F. C. Chambers has succeeded W. Clapper as general manager of the Inter-Urban Railway, Des Moines, Iowa. Mr. Chambers will continue to act as general manager of the Des Moines City Railway.

Hon. William B. McKinley, president of the Illinois Traction system, Peoria, Ill., and Congressman from the Nineteenth Illinois District, has won the Republican nomination for United States Senator in the recent state primary election.

H. L. Treeman has tendered his resignation as superintendent of the electrical department of the Eastern Pennsylvania Railways, Pottsville, Pa. Mr. Treeman was graduated from the Oklahoma Agricultural and Mechanical College in 1909 with the degree of Bachelor of Science, having specialized in mechanical and electrical engineering. For several years thereafter he was employed by the Edison Electric Illuminating Company, Brooklyn, N. Y. as power engineer. In 1915 he left the service of that company to accept the position of electrical engineer of the Eastern Pennsylvania Railways.

Prof. Charles F. Scott, chairman of the Department of Engineering of Yale University, returned on the *Finland*, on Sept. 25, from a three months' stay in Italy. Professor Scott has been representing the Western Electric Company on the problem of communication cable location, his associate being L. P. Ferris, formerly assistant engineer on the California inductive interference studies. The object of their trip was to determine the practicability of running a cable as projected between Milan, Genoa and Turin wihtout interference from railroad and transmission lines, and to determine what precautions should be taken by the telegraph administration and railroad administration or the former alone to prevent inductive interference. Part of the railway is already being operated by electricity and the rest soon will be. As a result of the summer's work a considerable amount of interesting information was collected with reference to inductive interference and three-phase lines under the peculiar conditions that surround this installation. A modified route was suggested for the cable free from disturbance with certain precautions.

W. I. Brown Promoted

Made Assistant to President Denman of the Tri-City Railway & Light Company

Walter I. Brown, for several years past secretary to B. J. Denman, president of the Tri-City Railway & Light Company, Davenport, Iowa, has been promoted to be assistant to President Denman. Mr. Brown assumed his new duties on Sept. 1. As right-hand man to Mr. Denman, Mr. Brown will occupy a post of great responsibility with one of the largest electric railway systems in the Middle West. The Tri-City Railway & Light Company, in addition to controlling the Tri-City Railway of Iowa and the Tri-City Railway of Illinois, owns the city lines in Muscatine, Rock Island, Moline, East Moline and other cities and towns in Illinois and Iowa. It also operates a number of interurban lines. The work of integrating the activities of this great network of lines will fall to no small extent upon the shoulders of Mr. Brown.

W. I. BROWN

Mr. Brown was born in Nevada, Mo., on Aug. 31, 1893. Seven years later he removed with his family to Davenport, Iowa. There he attended the public schools, graduating from the Davenport High School in 1911. In the following year he entered the employ of the Tri-City Railway & Light Company as a stenographer for J. M. Porter, then president of the company. After serving in this position for two years he was made secretary to Mr. Denman, then vice-president.

After serving as secretary to Mr. Denman for three years, Mr. Brown entered the United States Army in November, 1917. He was honorably discharged from military service in April, 1919, with the commission of Second Lieutenant and the rating of Assistant Camp Finance Officer, Camp Wadsworth, S. C. Immediately following his discharge he resumed his duties as secretary to President Denman, continuing in that capacity until his recent promotion.

G. M. Spidell, purchasing agent of the New York, Westchester & Boston Railway, has resigned.

Reid McManus has been elected secretary of the Hydro-Electric Power Commission of New Brunswick.

D. C. Bridges has been appointed superintendent of buildings of the Texas Electric Railway, Dallas, Tex.

J. F. Simerlee has been appointed superintendent of roadway of the Texas Electric Railway, Dallas, Tex.

C. W. Robinson has been elected chairman of the Hydro-Electric Power Commission of New Brunswick.

J. E. Gallaher has resigned as master mechanic of the Eastern Texas Electric Company, Beaumont, Texas.

C. O. Foss, a member of the Hydro-Electric Power Commission of New Brunswick, has been made chief engineer of the commission.

C. J. Crampton has been appointed superintendent of the safety and efficiency department of the Dallas (Tex.) Railway.

Charles Johns has succeeded J. F. Daugherty as manager of the St. Thomas Ontario Municipal Street Railway.

H. G. Crampton has been elected secretary and treasurer of the Capital Traction Company, Washington, D. C., succeeding the late R. D. Simms.

G. W. Carver has succeeded G. M. Spidell as purchasing agent of the New York, Westchester & Boston Railway, New York, N. Y.

J. W. Anderson has been appointed terminal freight agent of the Pacific Electric Railway, Los Angeles, Cal., to succeed T. H. Mann, resigned. Mr. Anderson was formerly local freight agent for the railway at Long Beach, Cal.

Robert W. Hewins, treasurer and general manager of the Norton, Taunton & Attleboro Street Railway, Norton, Mass., has resigned. Mr. Hewins has been connected with the railway for the past twenty-five years. The company's line was taken over for municipal operation by the towns of Norton, Taunton and Attleboro several months ago.

Chester B. Lawson has been appointed superintendent of the electrical department of the Eastern Pennsylvania Railways, Pottsville, Pa. He succeeds H. L. Treeman, resigned. Mr. Lawson was graduated from the Pottsville High School in 1905. After completing a course in electrical engineering at Lehigh University he was employed for a time in Boston, Mass. He has been connected with the Eastern Pennsylvania Railways for the past six years.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Price Trend of Iron and Steel Market Uncertain

Consumers Delay Buying in Hope of Lower Prices—Producers Discount Possibility of Reduction

In view of the direct bearing of the iron and steel market upon the buying of electric traction companies in many lines, such as car trucks and wheels, brake shoes, rails, and other track supplies, tools, etc., current discussion regarding the possible price trend of iron and steel is interesting. At present there seems to be two widely divergent views of the situation. Consumers are very generally holding off ordering with the expectation of lower prices developing. Producers, on the other hand, say there can be no immediate reductions, but that even higher prices on iron and steel may develop. This view is apparently based on the grounds that the general steel market is still largely under-supplied, that labor is high and transportation costs are much greater.

At present the market is rather quiet. Transportation has improved to such an extent that unfilled tonnages have been reduced by two-thirds, it is stated. Railroads as yet have not ordered heavily and many cancellations have been received from automobile, oil and other industries. Export demand is said to be extremely light just now. Furthermore the price of coke is showing signs of softening. These factors would seem to justify hopes of lower prices, and, in fact, slightly weaker quotations on the part of independent producers are noted in one or two lines. The average price of eight principal iron and steel products as quoted by *Iron Age* shows no change during the last four weeks, however.

DEMAND LIGHT AT PRESENT

On the other hand, this is normally the slack season in the iron and steel industry. In spite of this, cancellations from automobile manufacturers and others seem to have been readily absorbed. To compensate for this loss demand for structural steel is apparently reawakening. Orders booked during August were 72,200 tons, or 40 per cent of the total month's capacity, it is stated. A very large market is also expected to develop the steam railroads. Thus far orders in that quarter have for the most part been confined to small items such as spikes, bolts and tie plates. In 1921, however, a large portion of their program of expenditures, amounting close to $1,000,000,000, it is estimated, is expected to be placed. At present the United States Steel Corporation is said to be booked ahead with orders for about nine months, while independent producers have sufficient business on hand to carry them through the winter. These conditions, producers hold, substantiate their position that prices will not drop materially.

In analyzing the probable trend of prices it must be noted that there are two price levels. The price scale of the United States Steel Corporation averages $21 per ton below the independent level. In many quarters the view is held that the independents' prices must come down to approximately the level of the United States Steel Corporation before buying will be resumed on a large scale. If one considers the latter's quotations as the market level, however, these same opinions hold that no general reduction can be made. Opinions differ whether the United States Steel Corporation will be able to absorb the increase in freight costs, which is estimated to total approximately $50,000,000 annually on the raw and intermediate material used by the corporation. A more definite trend to the market is expected to be evident in the next month or so. At the present time the situation is one of "watchful waiting."

Active Demand for Window Glass

Stocks Are Low, but Manufacturing Conditions and Deliveries Are Improving—Prices Show Great Steadiness

Manufacturers of window glass report a very active demand for their product at present. One large producer has been so far behind on filling orders this year that no new business was sought for a period of four months. Orders are being received from electric railways in good volume and a still heavier buying movement seems to be expected from that source as traction companies continue to change over from summer to winter equipment. Demand for glass for building construction has not been as heavy as in other seasons, it is stated, but this market is expected to develop large orders in the not far distant future.

Raw material difficulties seem to have been the chief obstacle retarding output. Sand, chemicals, coal, gas and lumber for boxing have been both scarce and high in price, it is reported. The production of one representative producer is only 60 per cent of normal at present. Conditions in general are improving, however. Manufacturers are now fairly well caught up on orders and deliveries can be made in better time. Delivery quotations cover a wide range of from about two to eight weeks. Labor conditions are also beginning to ease up. Stocks while fair on some types of window glass, on the whole are low. This is especially true of the double-strength glass usually placed in car windows. According to one producer the production of this type of glass is proportionately slower than ever before. The receipt of orders which should have arrived months ago is said to have somewhat relieved the present situation. Some quantities of window glass are arriving from abroad, notably Antwerp, but these receipts are but a drop in the bucket. The field is apparently too well covered by domestic producers to encourage foreign competition.

Producers see no reason for any immediate change in prices. The consensus of opinion seems to be that no fluctuation will take place within the next few months. One reason may be the fact that manufacturers have contracted ahead for raw material supplies.

Carbon Brush Deliveries Fairly Prompt

From Two to Three Weeks Is Generally Quoted—Heavy Demand and Good Supply of Raw Material

There is no shortage of carbon brushes, according to representative manufacturers. Deliveries are being made in good shape and are improving somewhat under the influence of better conditions of production. In general, orders are filled in about two weeks, ranging up to three weeks in many cases. So far as could be learned but one producer is unable to make such prompt shipments and from four to eight weeks is quoted in this case. Deliveries of railway type brushes are made in slightly better time in some cases and about within the same limits in others.

Heavy orders are generally reported by producers. Railway brushes are even in stronger demand than usual. In some quarters this demand is said to have slackened recently, but a larger buying movement seems to be looked for soon. Traction companies are said to have pretty well anticipated their needs for brushes and their reserve supplies are consequently fairly heavy.

Factory stocks of unfinished carbon are in good condition, so that raw material is not seriously affecting the supply of carbon brushes. Improved transportation is also aiding the situation. As a result, production, except in one or two instances, is proceeding at a normal pace. One of the large manufacturers reports an increase in output last year of 33 per cent. The present season is expected to show an even larger output due to plant additions. Labor conditions in the industry are much better and no trouble from this source is now being experienced. An entire absence of cancellations is also noted.

Prices have been holding steady. Most manufacturers say they anticipate no increase soon, though the exception is provided by one large company which looks for higher prices to materialize.

Production of Turnstiles Is Improving

Raw Material Has Been Showing Deliveries—Demand Is Normal, with Prices Holding Steady

Manufacturers of turnstiles report a demand for their product during the past year that compares favorably with other seasons. Orders from electric railways have not been extraordinarily large because the construction of new terminals, etc., has been somewhat curtailed. On the other hand, the buying of turnstiles by such interests as athletic and amusement parks has been unusually large, it is reported. Producers are extremely optimistic over the outlook for next year's business.

Construction work in many lines which requires the use of turnstiles is expected to go forward in increased volume. One of the large manufacturers is also looking for a big field to open up in the use of these machines on street cars to register automatically the number of passengers. A turnstile for this purpose has been developed and successfully experimented with on several lines, it is stated.

At the present time factories are endeavoring to accumulate surplus stocks in anticipation of the expected spring buying. Production during the winter closely follows the estimated future requirements of all interests, however. For this reason manufacturers state that traction companies should now start to figure their needs for 1921 in this line, with a view to ordering supplies three months in advance for shipment next spring. In this producers can accurately gage the number of turnstiles that will be needed next year. By governing production accordingly delays in making shipments may be avoided, it is said.

The labor situation at factories is reported satisfactory. Raw material has been retarding production in the past, however. This condition is now considerably relieved as a result of better transportation and quicker shipments from steel mills. Orders in some cases have been running behind and stocks of the finished goods have been correspondingly low. With the dull season at hand, however, this is expected to be remedied.

A few cancellations have been made as a result of long deliveries, but the number, it is stated, is not alarming. Prices have remained steady for some months and the outlook seems to be for the present level to hold firm until the first of next year at least. After that date the tendency of prices may be upward, manufacturers think.

Rolling Stock

Birmingham (Ala.) Railway, Light & Power Company is reconstructing many of its old cars and installing new motors.

Interstate Public Service Company, Indianapolis, Ind., has purchased fifteen new freight cars that are scheduled for delivery in December, it is reported. The eight all-steel 62-ft. passenger cars ordered some time ago are expected to be placed in operation in November, it is stated.

Track and Roadway

Danbury & Bethel Street Railway, Danbury, Conn.—The Danbury & Bethel Street Railway has begun the construction of a line on West Street. This connecting line joining the present tracks on West Street opposite Orchard Street will run alongside the park at the junction of West and Division Streets and will not go into the center of the street until after it leaves Division Street.

Central Texas Electric Railway, Waco, Tex.—O. A. Ryfle, president and general manager of the Central Texas Electric Railway, with headquarters at Waco, has been advised that 100 tons of steel rails for the Waco-Temple Interurban are now en route to Waco. Other material is on the ground and the laying of the track of the first 6 miles of this line, extending from Waco to Robinson, will begin in a few days.

Richmond - Fairfield Railway, Richmond, Va. — The Richmond - Fairfield Railway, a recent incorporation, is making real progress according to its presi-

NEW YORK METAL MARKET PRICES

	August 3, 1920	October 1, 1920
Copper ingots, cents per lb	19.00	18.50 to 18.75
Copper wire base, cents per lb	22.50 to 23.00	21.50 to 22.00
Lead, cents per lb	8.50	7 75
Nickel, cents per lb	43.00	43.00
Zinc, cents per lb	8.02½	7.70 to 7.80
Tin, cents per lb	48.25	42.75
Aluminum, 98 to 99 per cent, cents per lb	33.00	35.10

OLD METAL PRICES—NEW YORK

	Aug. 3, 1920	Oct. 1, 1920
Heavy copper, cents per lb	15.50 to 16.00	15.25 to 15.50
Light copper, cents per lb	13 50 to 13.75	13.00 to 13.25
Heavy brass, cents per lb	9.25 to 9.50	8.50 to 9 00
Zinc, cents per lb	5.50 to 5.75	4 50 to 5.00
Yellow brass, cents per lb	7.25 to 7.75	6.50 to 7.00
Lead, heavy, cents per lb	7.25 to 7.50	6.50 to 6.75
Steel car axles, Chicago, per net ton	33.50 to 34.50	33.00 to 34.00
Old carwheels, Chicago, per gross ton	36.00 to 36.50	37.00 to 38.00
Steel rails (scrap) Chicago, per gross ton	28.00 to 28.50	27.50 to 28.00
Steel rails (relaying), Chicago, gross ton	35.00 to 36.00	37.50 to 38 50
Machine shop turnings, Chicago, net ton	9.50 to 10.00	9.00 to 9.50

ELECTRIC RAILWAY MATERIAL PRICES

	August 3, 1920	October 1, 1920
Rubber-covered wire base, New York, cents per lb	28.00	28.00
Weatherproof wire, (100 lb. lots), cents per lb	29.00	29.00
Standard Bessemer Steel Rails, per gross ton	45.00 to 63 00	45 00 to 63.00
Standard open hearth rails, per gross ton	47 00 to 65 00	47.00 to 65.00
T-rail, high (Shanghai), cents per lb	3.00	.....
Rails, girder (grooved), cents per lb	3.00	...
Wire nails, Pittsburgh, cents per lb	3.25 to 4 50	4.25
Railroad spikes, drive, Pittsburgh base cents per lb	4.00 to 5 75	4.50 to 6.00
Railroad spikes, screw, Pittsburgh base, cents per lb	...	...
Tie plates (flat type), cents per lb	4 00	4 00
Tie plates, (brace type), cents per lb	4.00	4 00
Tie rods, Pittsburgh base, cents per lb	7.00	7 00
Fish plates, cents per lb	3.75 to 4 75	4.00 to 5 00
Angle bars, cents per lb	3.75 to 4 75	4 00 to 5.00
Rail bolts and nuts, Pittsburgh base, cents per lb	6 00 to 7 50	6.00 to 7 00
Steel bars, Pittsburgh, cents per lb	2.35 to 4.00	2.35 to 4.00
Sheet iron, black (24 gage), Pittsburgh, cents per lb	4.20 to 7 85	4.20 to 7.35
Sheet iron, galvanized (24 gage), Pittsburgh, cents per lb	5.25 to 8.55	5.25 to 8.30
Galvanized barbed wire, Pittsburgh, cents per lb	4.45	4.45

	August 3, 1920	October 1, 1920
Galvanized wire, ordinary, Pittsburgh, cents per lb	4.20	3.70 to 4.70
Car window glass (single strength), first three brackets, A quality, New York, discount*	77%	77%
Car window glass (single strength), first three brackets, B quality, New York, discount	77%	77%
Car window glass (double strength, all sizes, AA quality) New York, discount	79%	79%
Waste, wool (according to grade), cents per lb	17 to 23	17 to 23
Waste, cotton (100 lb. bale), cents per lb.	15 to 17½	15 to 17½
Asphalt, hot (150 tons minimum), per ton delivered	38.00	40.00
Asphalt, cold (150 tons minimum, pkgs. weighed in), per ton	42.50	42.50
Asphalt, filler, per ton	45.00	40.00
Cement, New York, per bbl	5.10	5.10
Linseed oil (raw, 5 bbl lots), New York, per gal	1.58	1.22
Linseed oil (boiled, 5 bbl. lots), New York, per gal	1.605	1.24
White lead (100 lb. keg), New York, cents per lb	15½	15½
Turpentine (bbl. lots), New York, cents per gal	1.65	1.46

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*These prices are f.o.b. works, with boxing charges extra.

dent. The relaying of track and the installing of new overhead wires have already been started.

Toronto (Ont.) Civic Railway.—Commissioner R. C. Harris has recommended the construction of a permanent double-track line on Bloor Street from Runneymede Road to Jane Street. It will cost approximately $104,245.

Pacific Electric Railway, Los Angeles, Cal.—The Pacific Electric Railway has recently announced in detail its program of reconstruction work delayed by the late war. The greater portion of this improvement work in Southern California became necessary principally through franchise and legal obligation. The improvement plans referred to are now under way.

Hydro-Electric Power Commission, Ont.—The double-tracking of London Street, West, has been started, and the proposed improvements to the local street railway system, now operated by the Hydro-Electric Commission of Ontario will be rushed to completion. In the June 26 issue of the ELECTRIC RAILWAY JOURNAL, reference to this improvement on London Street was made.

Chicago North Shore & Milwaukee Railroad, Highwood, Ill.—The Chicago, North Shore & Milwaukee Railroad operating in Waukegon will extend its line from North Avenue to Greenwood Avenue, then east to the Chicago & Northwestern Railroad's tracks. A survey of these streets has just been made and the work of estimating the cost is well under way. The extension will be approximately 2 miles and is practically assured.

Connecticut Valley Street Railway, Greenfield, Mass.—The Connecticut Valley Street Railway has petitioned the Selectmen of Greenfield to relocate the tracks in Deerfield Street and to add a spur track from the main line.

Brockton & Plymouth Street Railway, Plymouth, Mass.—The Brockton & Plymouth Street Railway has laid new track from the carhouse to Jaboz Corner and from Hotel Pilgrim to Hornblower's estate.

Trenton & Mercer County Traction Corporation, Trenton, N. J.—The State Highway Commission has approved of the application of the Trenton & Mercer County Traction Corporation for the removal of a spur on its Slackwood branch along the Brunswick pike.

New York, Westchester & Boston Railway, N. Y.—The New York, Westchester & Boston Railway expects to build 1.5 miles of standard double-track railroad, an extension of the present line from a point ¼ mile east of New Rochelle to Chatsworth Avenue, Larchmont.

Brockton & Plymouth Street Railway, Plymouth, Mass.—The Brockton & Plymouth Street Railway has installed two miles of copper trolley wire and plans for additional wire have been made. Nearly 200 new 35-ft. poles have been set replacing old equipment. The wooden poles upon the West side of Main Street will soon be removed and permission has been secured of all the property owners to string the trolley wire to the buildings.

St. Paul City Railway, Minneapolis, Minn.—The St. Paul City Railway will extend its lines in the suburb 3 miles just as soon as earnings will permit.

St. Joseph Railway, Light Heat & Power Company, St. Joseph, Mo.—Residents of St. Joseph have petitioned the City Council for an extension of the Prospect Avenue line to Third Street and Hamburg Avenue. The St. Joseph Railway, Light, Heat & Power Company is not in favor of this movement on the ground that it would not be a profitable undertaking.

West Virginia Traction & Electric Company, Wheeling, W. Va.—The West Virginia Traction & Electric Company will start at once the laying of the new tracks that will enable the re-routing of its cars up Eoff to Twelfth, to Chapline and South to Sixteenth on the outbound trip. The new routing will dispense with the Market Street tracks and traffic to Elm Grove down that thoroughfare. It will relieve traffic congestion along upper Chapline Street, Eleventh and Market between Eleventh and Sixteenth.

Power Houses, Shops and Buildings

Three Rivers (Que.) Traction Company.—The Three Rivers Traction Company has purchased a site on St. Maurice Street and contemplate erecting a station and waiting room.

New York, Westchester & Boston Railway, N. Y.—The New York, Westchester & Boston Railway expects to build one 16-ft. I beam and concrete slab bridge and two frame temporary stations with standard high platforms. One will be located about midway at Potter Avenue and one at Chatsworth Avenue at the Larchmont end.

Havana Electric Railway, Light & Power Company, Havana, Cuba.—The Havana Electric Railway, Light & Power Company is planning an extension and reconstruction of its shops for the maintenance of rolling stock.

Havana Electric Railway, Light & Power Company, Havana, Cuba.—The Havana Electric Railway, Light & Power Company has recently contracted for 50,000 k.w. generating apparatus to install in the present power plant. There will be additions to the piping system, and a distilling equipment for boiler feed water, new feed pumps and economizers is being considered. The company will also build a reinforced concrete wharf on the harbor frontage of the gas works property at Rincon de Melones, which will be provided with movable coaling crane to receive coal from ships and barges and to load cars—about 100 tons per hour capacity. Another improvement will be the construction of a steel building, 50 ft. x 150 ft. for company automobile trucks.

Trade Notes

The General Electric Company, Schenectady, N. Y., is having plans prepared for a five-story factory addition, 70 ft. x 400 ft., to its Pittsfield Works.

The Marion Insulated Wire & Rubber Company, Marion, Ind., has awarded contract for a three-story-and-basement, 35-ft. x 60-ft. extension.

The Consolidated Wire and Machinery Corporation, 519-527 West Van Buren Street, Chicago, is issuing a loose-leaf price list of new and second-hand motors, Kuhlman transformers and miscellaneous materials.

The Monroe-Louisiana Carbon Company, Monroe, recently organized, contemplates the construction of a large carbon plant at Hancock, near Monroe, to cost, including equipment, about $1,000,000. Barney Oakland of Monroe is superintendent.

Roller-Smith Company, 233 Broadway, New York City, announces the appointment of the Mountain States Machinery Company, 1710 Glenarm Street, Denver, Col., as its agent for the states of Colorado, Wyoming and New Mexico. The Mountain States Machinery Company will, in addition, handle the products of Crocker-Wheeler Company, Maloney Electric Company, Cutler-Hammer Manufacturing Company, Terry Steam Turbine Company and others.

New Advertising Literature

Panel Supports.—The General Electric Company, Schenectady, N. Y., has issued bulletin No. 47,703-A, to supersede No. 47,003. It describes standardized fittings and such accessories.

Combustion Control.—The Engineer Company, 17 Battery Place, New York, has just printed a booklet on "Modern Practice in Combustion Control," of interest to all steam-station engineers.

Insulator Testing.—T. F. Johnson, Jr., Atlanta, Ga., is distributing five booklets describing his insulator-testing methods and methods of working on live lines.

Melting Pots.—The Cutler-Hammer Manufacturing Company, Milwaukee, Wis., has issued a two-page leaflet, entitled "Metal Melting Pots," describing the C-H melting pots, both portable and bench types.

Switchboard Panels.—General Electric Company, Schenectady, N. Y., has issued bulletin 47001-A, superseding No. 47001, on standard unit switchboard panels for both direct current and alternating current in large and small capacity plants.

Water Softeners, Filters, Etc.—The Permutit Company, 440 Fourth Avenue, New York City, has issued bulletin No. 101, entitled "Permutit Water Rectification Systems," in which it describes and illustrates its products, including water softeners, filters, manganese removal equipment, etc.

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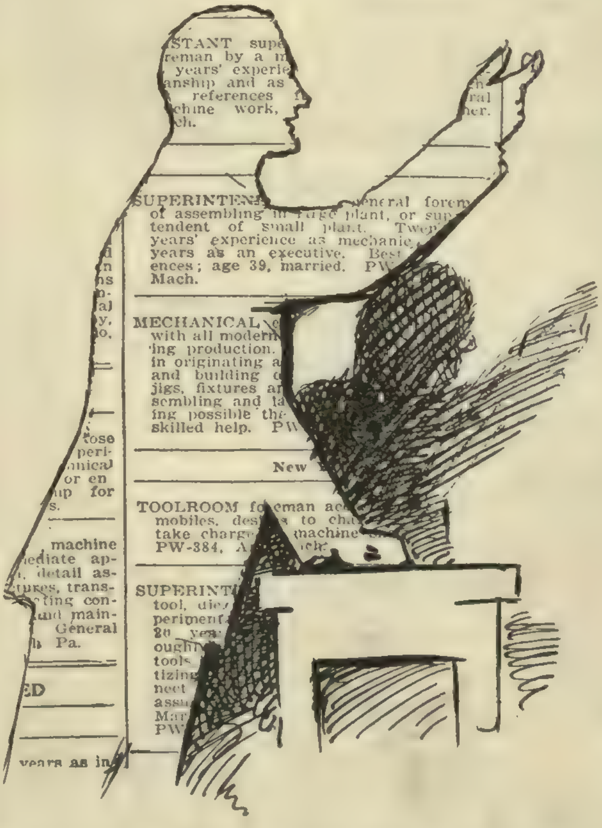

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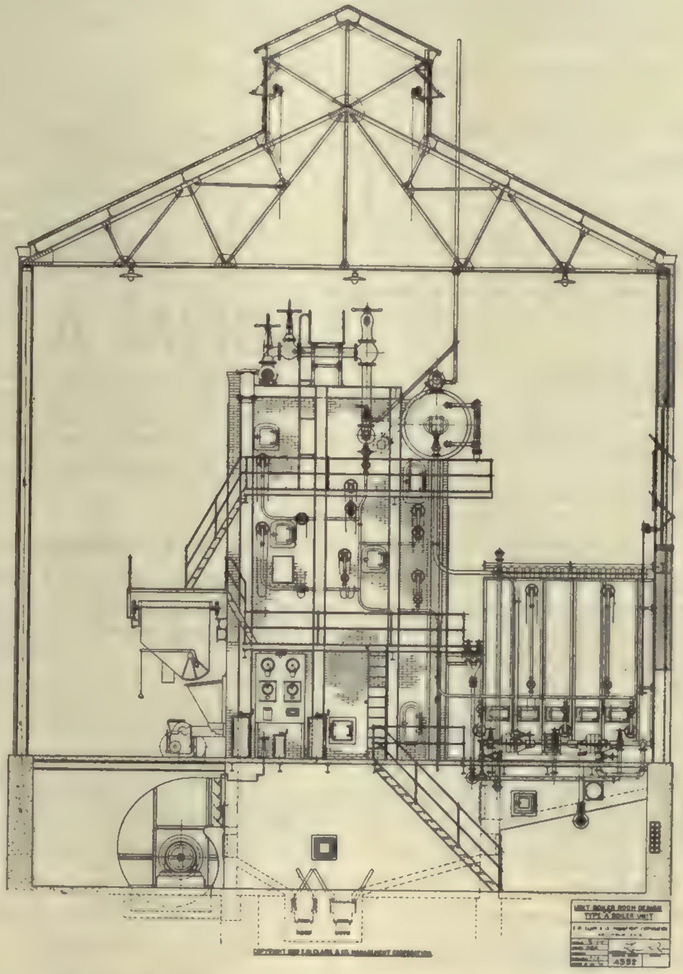

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TRACK drilling operations, with Little Giant Portable Electric Track Drills on the job, are handled at speeds ten to twelve times faster than old-time hand methods, and at a saving of 85 to 90% in cost. Is any further argument for their adoption necessary?

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Cost-Cutters

Track "dentists" that cut down wear

JUST as prompt attention to a decayed spot in a tooth preserves the tooth, so Little Giant Portable Electric Grinders lengthen track life by keeping "flats" and corrugations smooth.

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EL-36

GIANT PNEUMATIC AND ELECTRIC TOOLS
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Track Tools

C-P Labor Savers

Little Giant Portable Electric Drills

WORK hustled through, lower man-hour and tool-year costs, reduced tool investment — all argue in favor of installing Little Giant Portable Electric Tools.

All sizes, in A.C., D.C., or Universal types, are characterized by large overload capacity, perfect commutation, high efficciency, low temperature rise and long life. Ask for Bulletin 581.

Little Giant Geared Air Hoists

HOIST Pneumatically! Put a Little Giant on the job and let it pay for itself. Tedious, expensive hand-lifting has no place in modern shops. Little Giants do the work of ten men at *one-tenth* the cost of hand labor.

Absolute operating safety. Air valve must be *held* open to admit power. Jam-ups are prevented by limit stop. Automatic air-brake prevents slippage. Both portable and trolley-mounted types. Capacities 1 to 10 tons. Ask for Bulletin 599.

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FOR precise internal or external grinding where accuracy is no less an object than speedy, economical operation, Little Giant Precision Grinders are indispensable aids to good work, quickly done.

Sturdily built. High-grade ball bearings, proper cutting speeds, accurate balancing of all running parts, efficient cooling system, A.C., D.C., and Universal types in a variety of sizes. Ask for Bulletin E-61.

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BOYER PNEUMATIC HAMMERS • • LITTLE
CHICAGO PNEUMATIC AIR COMPRESSORS
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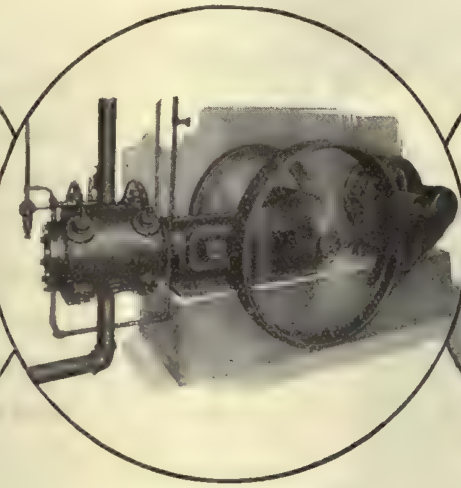
for Shop Use



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THESE widely used tools set a new pace in getting things done.

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Workmen prefer these tools once they get the "feel" of their superiority.

They do *more* and *better* work as a result. Ask for Bulletin 600.

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J-27

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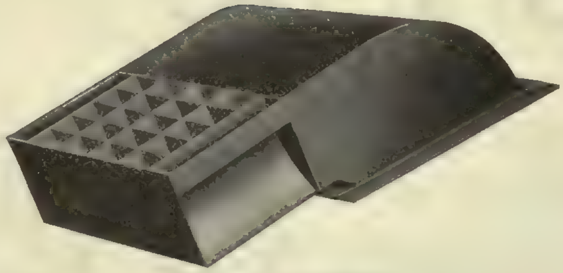

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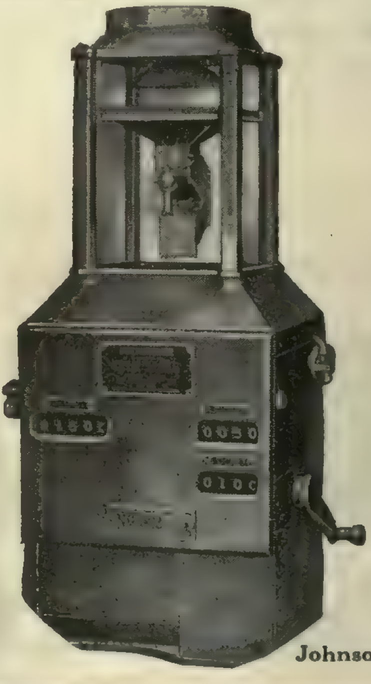

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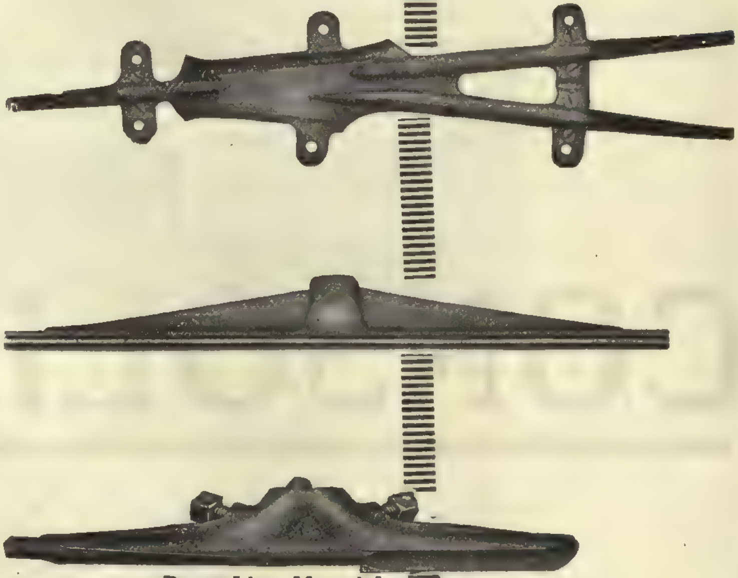
- Kelly Brake Jaw
- Clapp Fire-Resisting Paint
- National Safety Car Equipment Co.'s One-Man Cars



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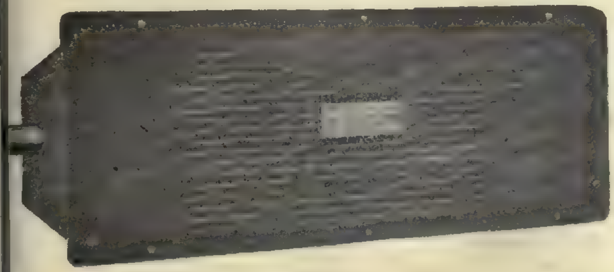
Panel Type



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This is the crowning achievement in the development of pneumatically operated car doors.

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There will be miniature cars on tracks connected to operate Nachod Signals. You can push the cars over the tracks, creating any particular condition and see for yourself just how and why Nachod Spells Safety. You can demonstrate for yourself on a small scale what is taking place on a large scale all over the country wherever Nachod Signals are safeguarding lives and increasing railway efficiency.

NACHOD SIGNALS

give high protection at a small ultimate cost. Made for single-track opposing movements, absolute or permissive, and for double-track following movements.

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give an insistent warning by bell, flashing lights and wig-wag. They warn public of danger from approaching cars, and advertise to the public progressive railway operation.

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give an accurate record at the end of the day of the entire car operation at a given point. They help maintain schedules and quickly locate causes of derangement.

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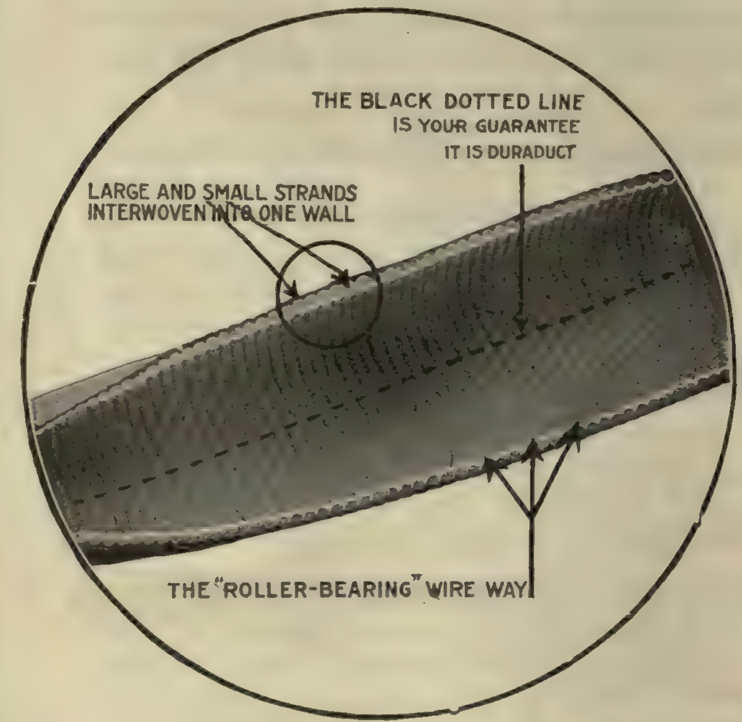
The Quality Car Conduit on the Famous Osgood-Bradley Safeties

IN keeping with the durable qualities of Osgood-Bradley Safety Cars, the Osgood-Bradley Car Company, Worcester, Mass., has installed thousands of feet of Duraduct for the protection of the trolley cables on this popular rolling stock.



Practically universal application of Duraduct has been made by hundreds of electric railways—particularly in modernizing the existing cars at minimum expense for safest, possible re-wiring and for the new wiring circuits required by the addition of electro-pneumatic specialties.

Because of its flexibility, roller-bearing wireway, easy cleating, lightness, resistance to fire and water, laborless handling in any size from push button to controller cable.

Duraduct is the original and only non-metallic car conduit with the single woven wall—identifiable always by the black dotted line on the interior surface.

TUBULAR WOVEN FABRIC CO.

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DUCT

And for other railway purposes, there's

DURACORD—The Quality Cord

A combination of wire, "better-than-Underwriter's rubber" and the famous woven cover to give you a long-lived cord for temporary trolley connections, droplights, pit lamps, oil and paint storage illumination, pit wiring, welding connections—in fact, any outdoors or indoors job where safety and ultimate economy are paramount.

TUBULAR WOVEN FABRIC CO.
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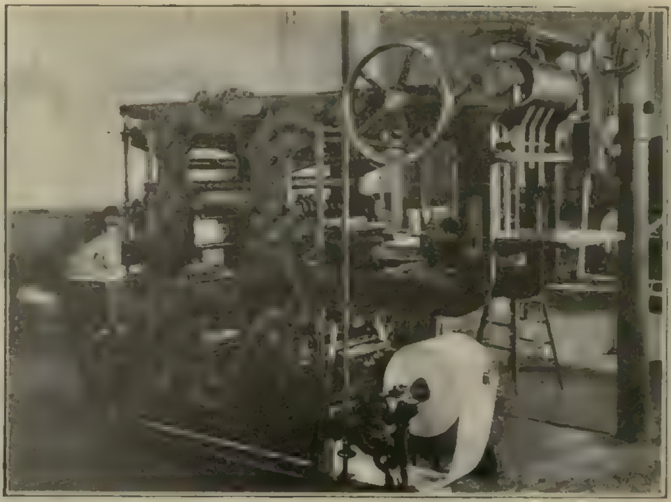
Section of United Railways Printing Dept.



Meisel Press in United Railways Plant

The Printing Department of The United Railways of St. Louis Cut a 23-Hour Day to 9 Hours with a

Meisel Rotary Press

The United Electric Railways of St. Louis operate over four hundred and fifty miles of city and interurban lines with about sixteen hundred cars. The daily demand for transfers amounts to approximately 700,000.

To meet this great demand for transfers, the company installed a Meisel Rotary Press a few months ago. This press, running at normal capacity, turns out 240,000 transfers complete, printed in two colors on each side, numbered, dated and folded. The company uses a double transfer—folded back to back. With the new Meisel Press, a 12-in. roll is used and 20,000 impressions made each hour, with 12 transfers per impression. Former methods required flat sheets 12 x 18 in. and printed 18 transfers to the sheet.

Since the company has installed the Meisel Rotary Press, two folding machines and another press have been shut down and are for sale. Not only that, but the former 23-hour day has been reduced to 9 hours.

Perhaps you are having trouble in getting out the required number of transfers at a reasonable expenditure. Confer with us and let us show you how to cut your printing costs for transfers, bulletins, reports, petitions, etc.

THE MEISEL PRESS MFG. CO., BOSTON, MASS.

Stitching Machines of United Railways

Stock Room of United Railways

BRIEFLY
CONSOLIDATED
PNEUMATIC DOOR ENGINES
ARE SAFE

They are made in different types, adapted to meet any requirements for either folding or sliding doors.

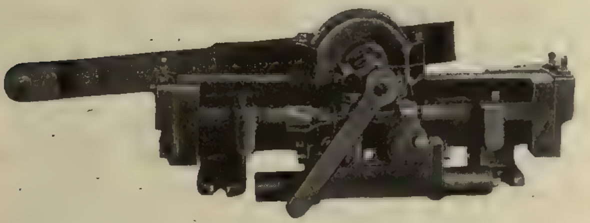
They operate doors quickly, smoothly and safely under all conditions.

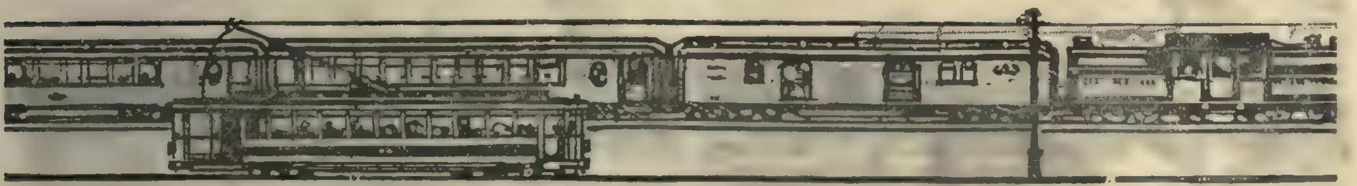
Slamming and banging, which occur with hand operated doors, are entirely eliminated by their use.

The refinements in the design and manufacture of these engines have produced a machine with almost human intelligence.

A request for particulars will bring you the story.

Consolidated Car Heating Co.
Albany, New York, Chicago





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ELECTRIC HEATERS

are practically the standard of the electric car heating world.

They are light in weight, strong in construction, efficient in operation, and all parts are quickly and easily renewable.

Consolidated heaters and accessories have stood the test of time.

Combined with Consolidated Thermostatic Control, they are an unbeatable combination.

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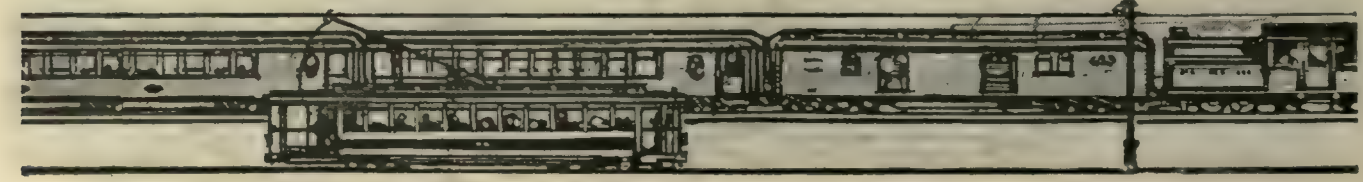


IDATED

THERMOSTATIC CONTROL

is the last word in heat regulation.

This means that your cars are always maintained at a comfortable temperature, regardless of outside weather conditions, at a minimum expenditure of electric current.

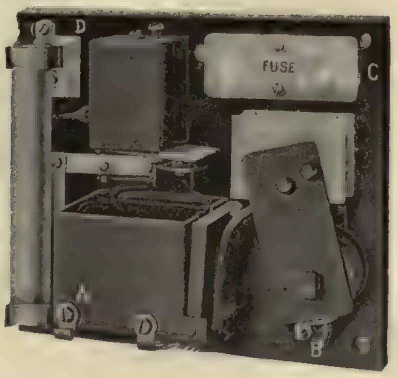
This regulation always allows just enough current to pass into the heaters to give the required amount of heat *and no more.*

Simple and substantial in construction.

Control switch made for wall mounting.

All parts may be easily inspected and replaced, when necessary.

Take the control of the heaters out of the hands of careless trainmen and put it in charge of this dependable device.



CAR HEATING CO.

YORK CHICAGO

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TROLLEY CIRCUIT BUZZERS

Nothing to wear, and see how simple in construction.

Circuit opened and closed in the interrupter—not in the buzzer.

Power needed—next to nothing.

Never a spark at the push-button.

Reliable and economical.

Specially designed push-buttons go with it.

Consolidated Car Heating Co.
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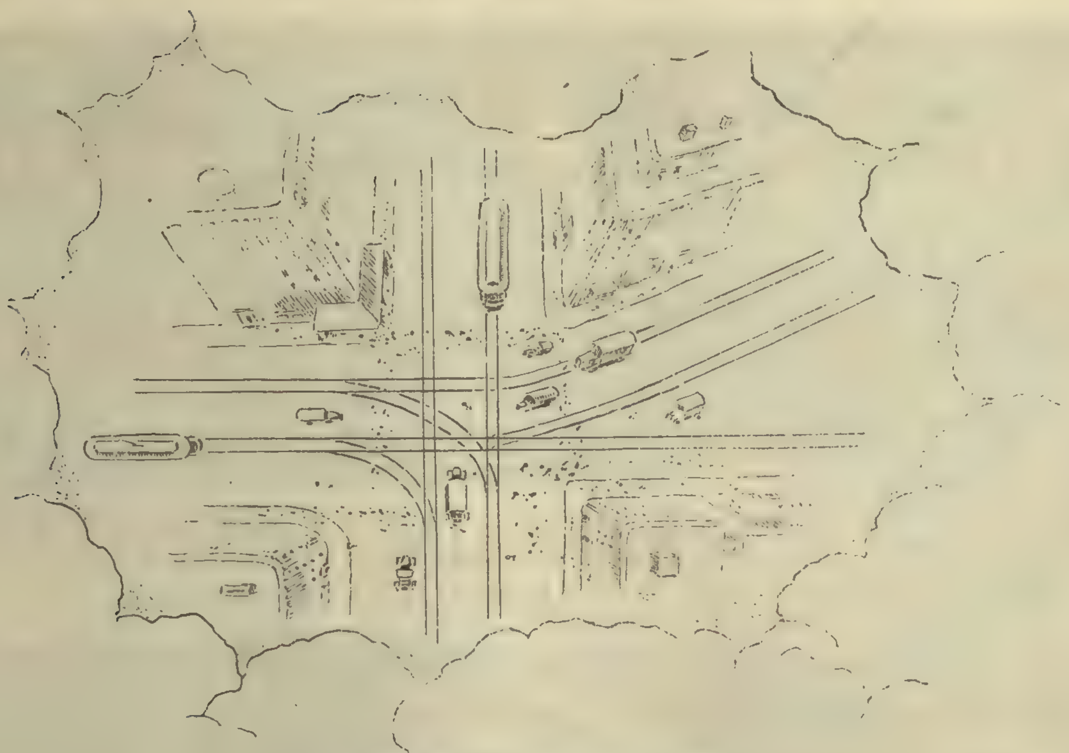


CHAPTER TWENTY-ONE

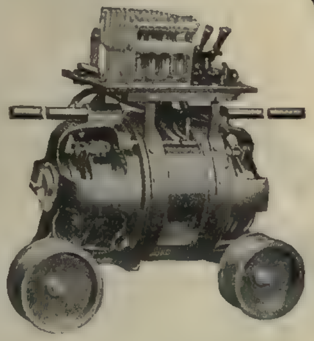
THE ALL-*BUT* PERFECT STATE

They Shall Take Things as They COME—and Make a GO of Them

The All-But-Perfect State applies only to railway conditions. It does not—and cannot apply to human nature as that can never be perfected. Therefore in the aforementioned state the towns will grow up in congested areas and the roads will have the problems of heavy traffic points—short headways—and a desire for fast movement through these sections.

But the roads will not growl about such conditions—they'll meet them squarely and treat them fairly. One way will be to put plenty of power on the line and pin a return ticket to it in the shape of Continuous Rail Bonds put on with the Dynamotor.

That will be their *comeback* to the question of the return circuit.



READING NUMBER TWENTY-ONE

You speak of putting on continuous bonds with the Dynamotor in heavy traffic centers. How can you do a bonding job without holding up traffic?

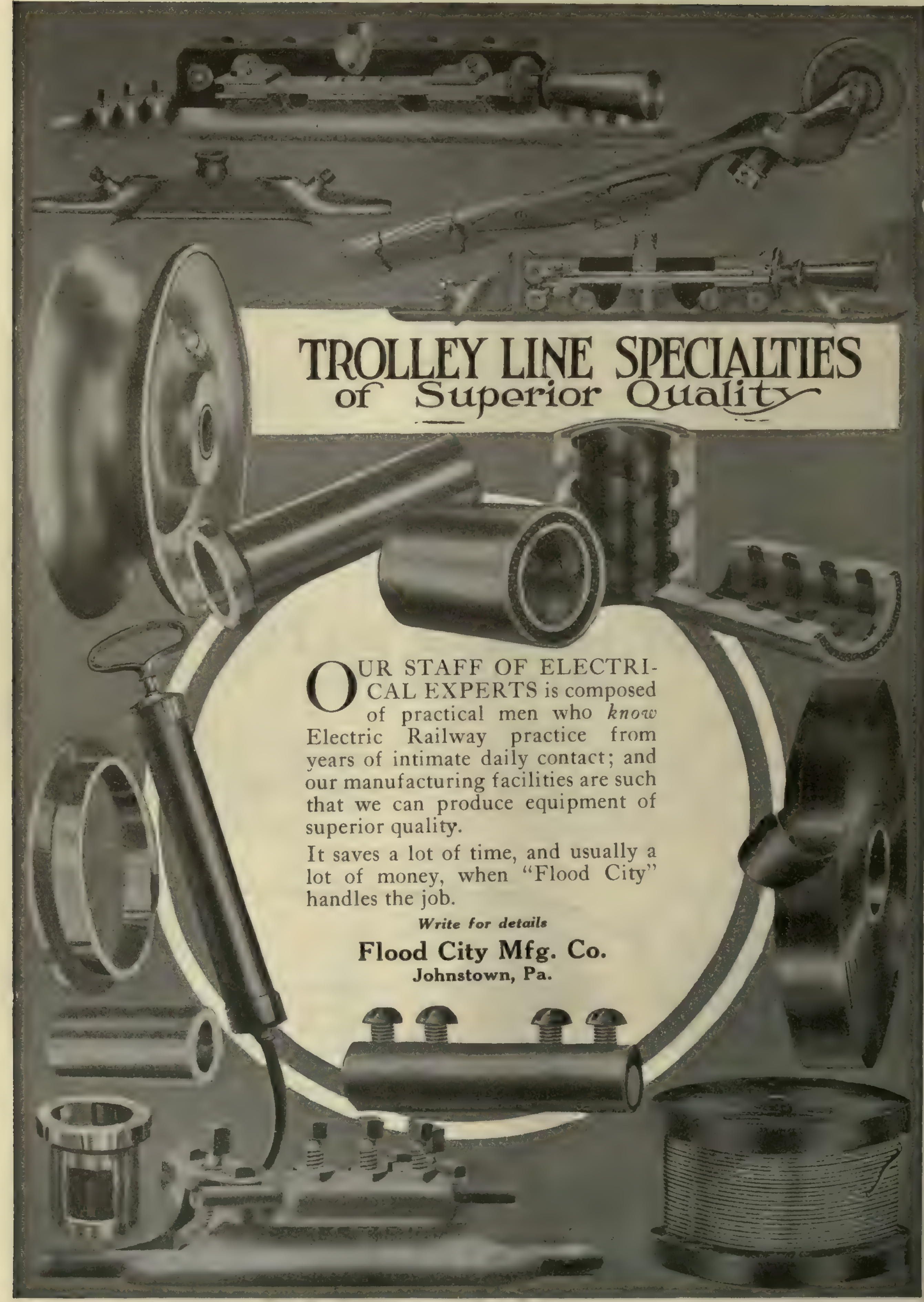
By the Lincoln process and the Dynamotor. They are both designed for this very purpose and the interesting part of it is that both work.

Rail Welding and Bonding Company

Formerly The Lincoln Bonding Co.

RW&B

Cleveland, Ohio.



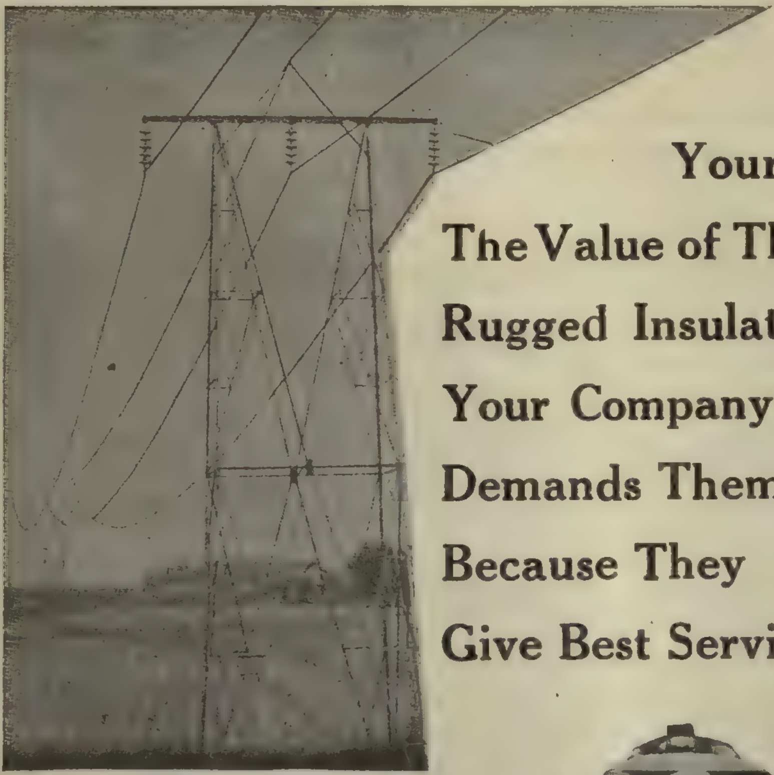
TROLLEY LINE SPECIALTIES of Superior Quality

OUR STAFF OF ELECTRICAL EXPERTS is composed of practical men who *know* Electric Railway practice from years of intimate daily contact; and our manufacturing facilities are such that we can produce equipment of superior quality.

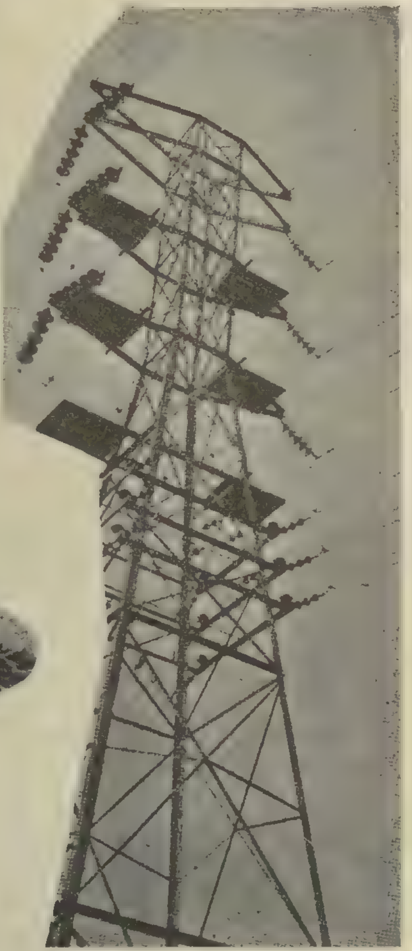
It saves a lot of time, and usually a lot of money, when "Flood City" handles the job.

Write for details

Flood City Mfg. Co.
Johnstown, Pa.



You Can't Evade
Your Plain Duty to Know
The Value of These
Rugged Insulators.
Your Company
Demands Them
Because They
Give Best Service.



Ask Us Who
Use Them.
Ask the Users
For Results on Transmission Lines.
A Ceramic Triumph Gives You
for the First Time
Thick, Uniform, Cementless Insulators—Better

Two hundred thousand since 1915 have gone where the lines were weak and held on against lightning, power arcs, shots and stones, and enemy propaganda. Even when deserted by defective relays under power arc they have held the line. They were chipped, of course, but the service carried on.

The porcelains specially mounted have gone into another hot place for practical test, as tunnel insulators on one of the best known electrified railroads. The hardware is flexible and lead dipped to resist sulphurous steam. They will become sooty, of course, but if power arcs occur they will not interrupt service.

Use them for strain and suspension insulators and for post type insulators around all substations; then you are sure to have no weak points. They are an insulator bargain because they are best. They are in great demand and if you are interested we suggest action.

New York Office:
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30 Church Street

Jeffery-Dewitt Insulator Co.
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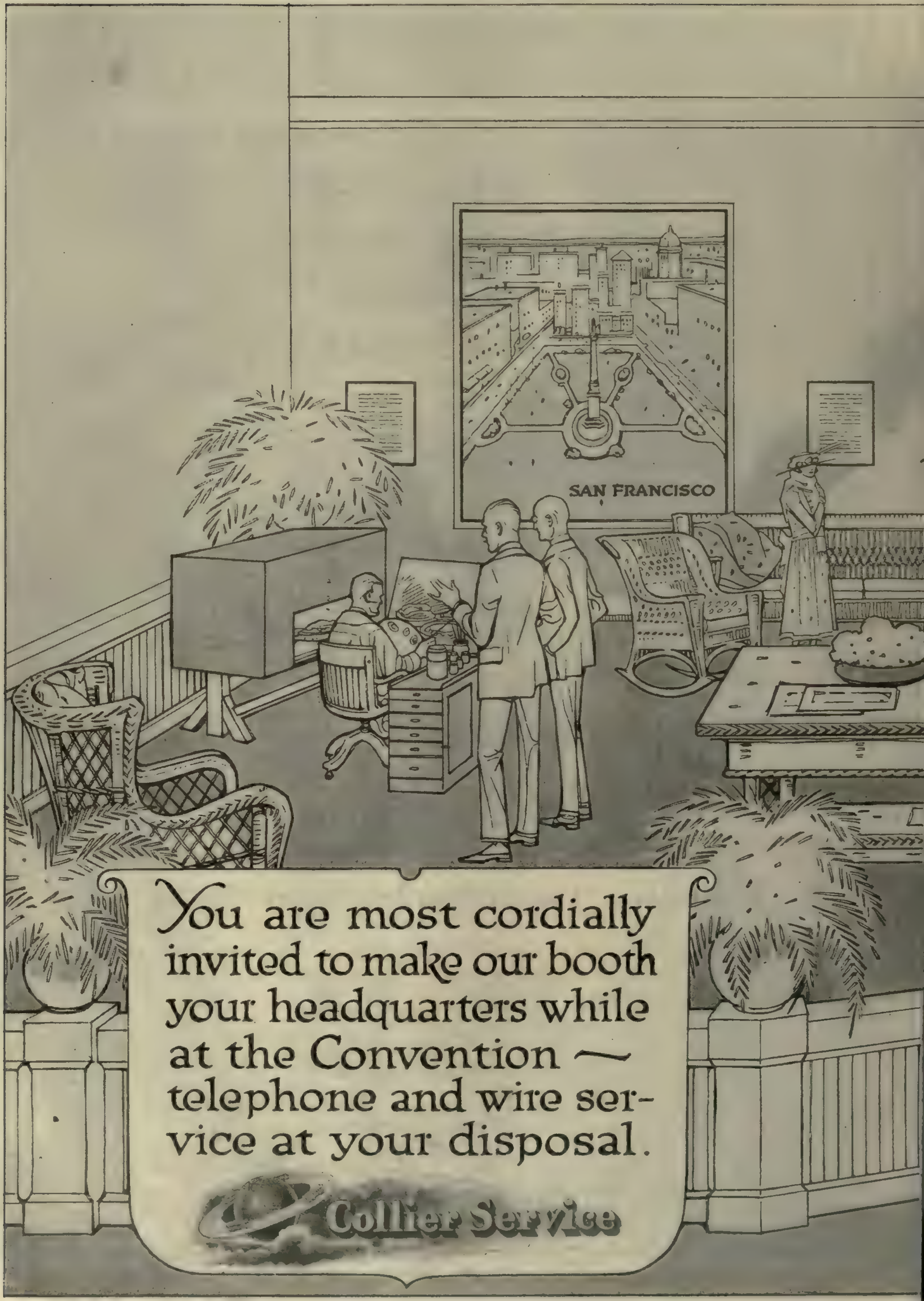

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For Your Wheel Work—

You MUST have some Lathe—

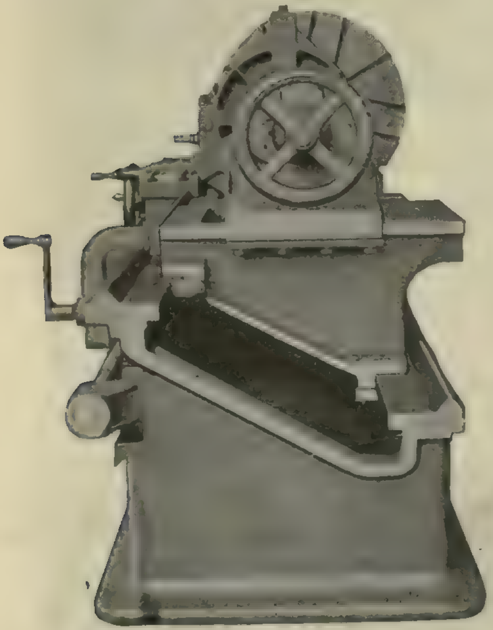
But a regular Car-wheel Lathe's cost is too much, when you haven't enough wheels to keep it busy all the time—

While a specialized Wheel Lathe might be idle for hours and even days at a time—

The McCabe "All-in-1" Lathe would be running all the time, handling

all of your wheel-work
all of your axles
all of your motor-bearings
all of your commutators—
all repair-jobs, large or small, and
all this capacity, speeds and feeds and conveniences—

At less than half the cost of a Wheel Lathe.



For WITHOUT a Lathe—

Sending wheels out is mighty expensive now-a-days, in more ways than one.

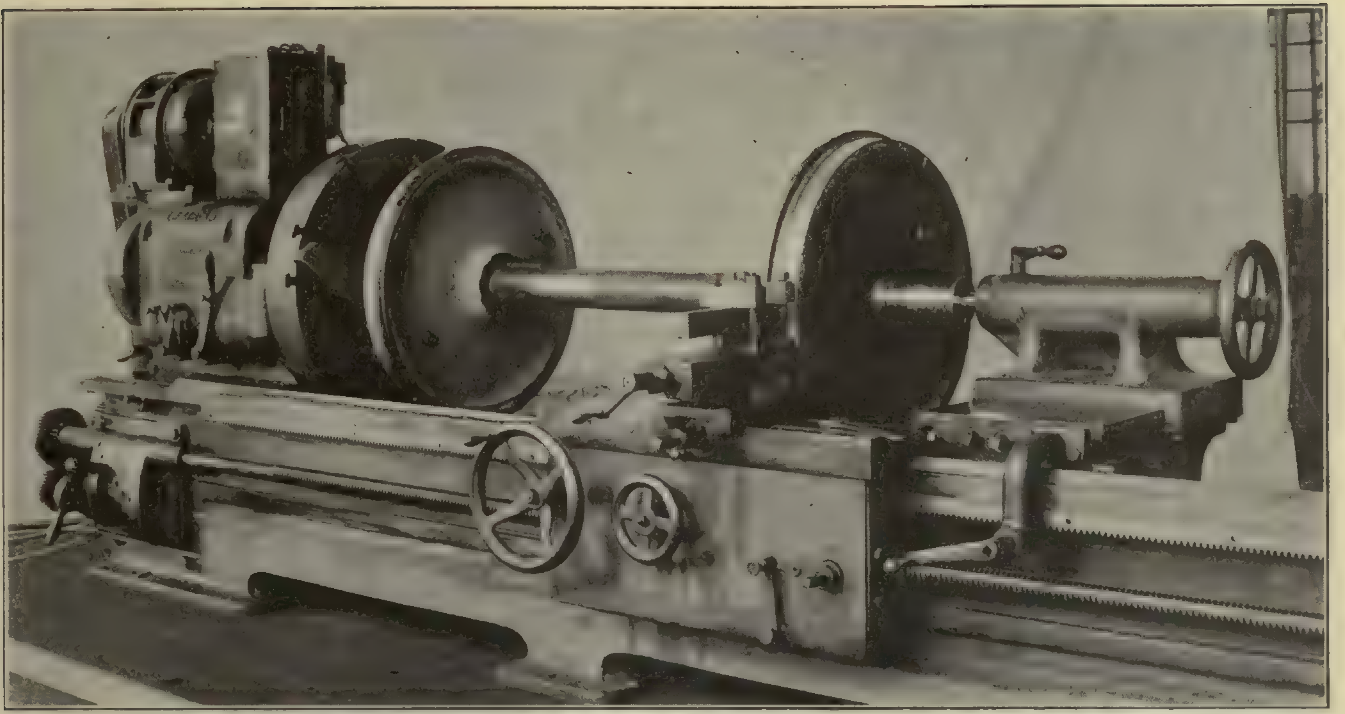
The reserve stock investment is a serious item.

The charge for wheel work done at outside shop rates, plus the cost of freight is high.

The uncertainty of depending on outside machine-shops for your repairs may tie up the use of a wheel-set and possibly a car for a week, when a lathe of your own would refit the wheels for service in a couple of hours.

True, it may not pay you to get a lathe good for wheel-work alone, but

It would at least pay you to investigate how McCabe's "All-in-1" handles all your wheels, and all the hurry-up repair jobs, large or small, in any street railway or power house repair shop.



The "Life" of Your Steel Wheels

depends on whether you have a Lathe of your own to keep them properly trued up—

With a McCabe "All-in-1" you could readily take three turnings and preserve the Wheels for about 225,000 miles per wheel set.

Without a Lathe, you would send them out perhaps twice, running the wheels too long until badly worn and contour of wheels is badly lost. Result, about 150,000 miles per wheel set.

McCabe's "All-in-1" Lathe 24/40 in. Swing is

The Lathe That Completes Your Repair Shop

ON EXHIBITION AND IN OPERATION TURNING WHEELS AT THE ATLANTIC CITY CONVENTION, YOUNG'S MILLION DOLLAR PIER—American Electric Railway Manufacturers Assn.

J. J. McCabe Lathe & Machinery Corp.

149 Broadway, New York City

The Ideal Equipment for City or Interurban Cars

Agasote
(Trade Mark)
For Roofing—Headlining—Wainscoting

Pantasote
(Trade Mark)
For Curtains

Better Service at Lower Cost

The Chicago Surface Lines in specifying Agasote on its new trailers for headlining know the actual SERVICE that this material will give.

On this property, as well as on hundreds of others there is ample evidence of the superiority of Pantasote curtains and Agasote roofing over all others.

Agasote for roofing will outwear wood many times. It is absolutely waterproof to start with and it stays that way.

In case of accident it is easily and rapidly patched.

Old-fashioned curtains wear out quickly. They are made of flimsy material, easily torn, stained and discolored.

Pantasote Curtains wear a great many times longer; are made tough and not easily torn. When washed they look as good as new.

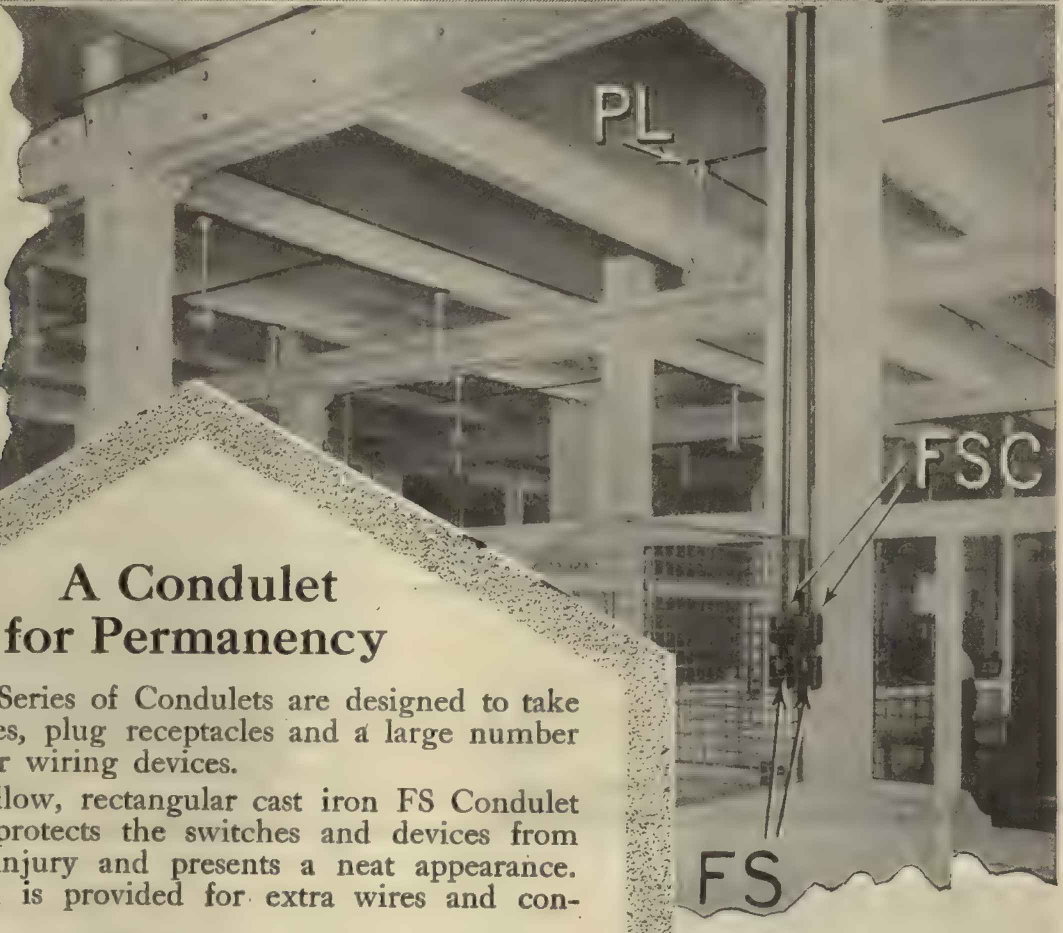
RESULT

Economy ***Light-weight*** ***Durability***

THE PANTASOTE COMPANY

11 Broadway, N. Y. People's Gas Bldg., Chicago, Ill. 751 Monadnock Bldg., San Francisco, Calif.

CONDULETS



A Condulet for Permanency

THE FS Series of Condulets are designed to take switches, plug receptacles and a large number of rectangular wiring devices.

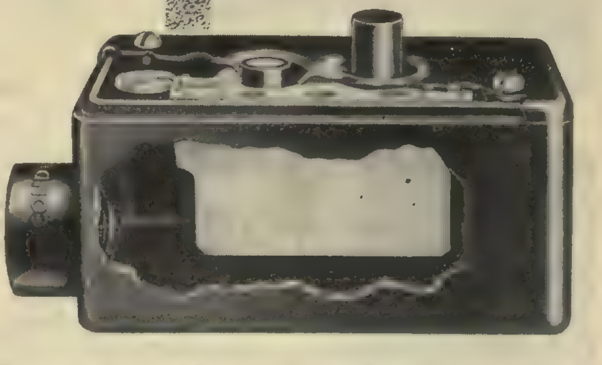
The shallow, rectangular cast iron FS Condulet shown here protects the switches and devices from mechanical injury and presents a neat appearance. Ample room is provided for extra wires and connections.

Hubs of different sizes and positions make it easy to select the Condulet best suited to the requirements. These Condulets are sometimes used as outlets or junctions, therefore, a line of porcelain and blank metal covers are available.

Let us mail a complete catalog.

CROUSE-HINDS COMPANY
SYRACUSE, N. Y.
BOSTON NEW YORK CHICAGO
Condulets Panelboards
Knife Switches Floodlights
Guy Anchors
1593

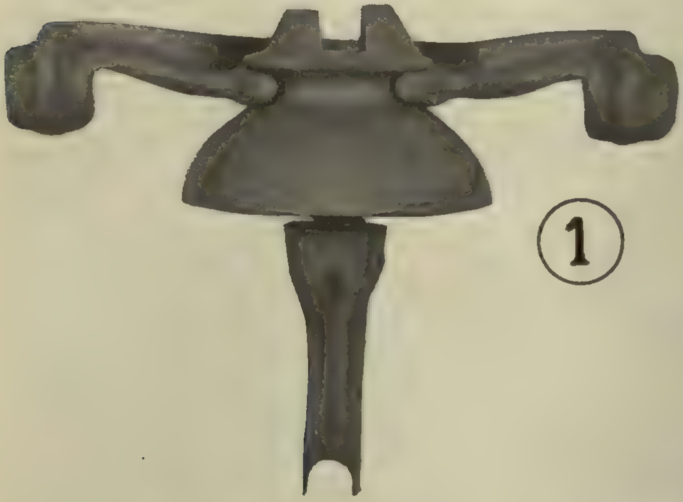
FS CONDULETS
are easily installed and wired.



Condulet the Job

CROUSE-HINDS

DREW Equipment



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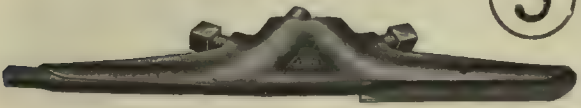

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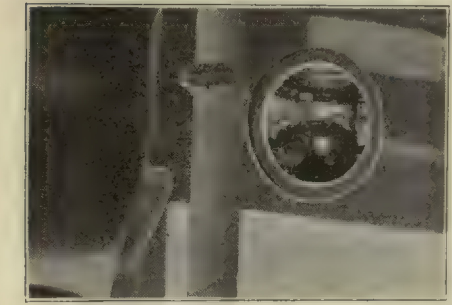


④

1. Drew Floating Bell Hanger

Embodies all the good features of the one-piece and three-piece type while eliminating weaknesses common to both. The bell turns freely on the yoke which permits the ear to be screwed "home" on the stud and turned in alignment with the wire.

2. Drew Triple Beam Insulator

Designed to provide smooth running service under the most severe operating conditions. Side pieces withstand all strains. Middle beam braces against end castings thus eliminating all tendency to buckle or break. Its strength, durability and light weight make it ideal for heavy interurban and city work.

3. Drew Samson Splicer

Cast of special bronze and non-arcing. They have repeatedly outworn the wire in which they were installed under the most severe operating conditions. Splicers with boss can also be furnished.

4. Drew One Man Car Mirror

Have proved a splendid aid in one-man car operation. High grade glass reflects clearly the interior of the car, giving the operator warning of passengers preparing to leave the car, and in general, enabling him to keep an "eye" on passengers.

5. Drew Pole Sleeve

Made of special malleable iron. It is well known that malleable iron resists rust far more successfully than steel. This feature, together with the tremendous strength of the sleeve, gives an old steel pole a 300% increase in life.

6. Drew Cushion Clinch Ear

These ears are made of bronze of A.E.R.A. specifications. The groove for two and a half inches on each side of the boss is cut deeper to provide a cushion effect. This lessens the pounding shock on the dead center, when the trolley wheel passes under the boss. Tests in service show it to have greater life than the old style and that it also prevents flattening of the trolley wire under the boss.

⑤

⑥

Write for Catalogs

for Electric Railways

7. Drew Special Hanger

For steel and aluminum messengers. Note that the set screw does not come in contact with messenger. Instead it comes down on the rod and the rod, in turn, on the wire. No danger of damage to strands and the *rod always hangs straight,* as the casting takes the angle of the sag.

8. Drew Catenary Trolley Hanger

Can be installed without removing the bolt that holds the clamping ears in place. Simply loosen the bolt, turn the free member of the ear at right angles and slip the messenger under the free end of the strap. Now tighten up the bolt and the job is done. Easy to handle and a big time saver.

9. Drew Feeder Clamp

"Drew Special" low resistance bronze insures toughness *plus* conductivity. The orifice in the lug is oblong instead of the usual round type. The diameter of the set screws being the same as the width of the orifice results in the compression of all strands of the cable, and makes it impossible for feeder strands to pass between the set screws and side wall.

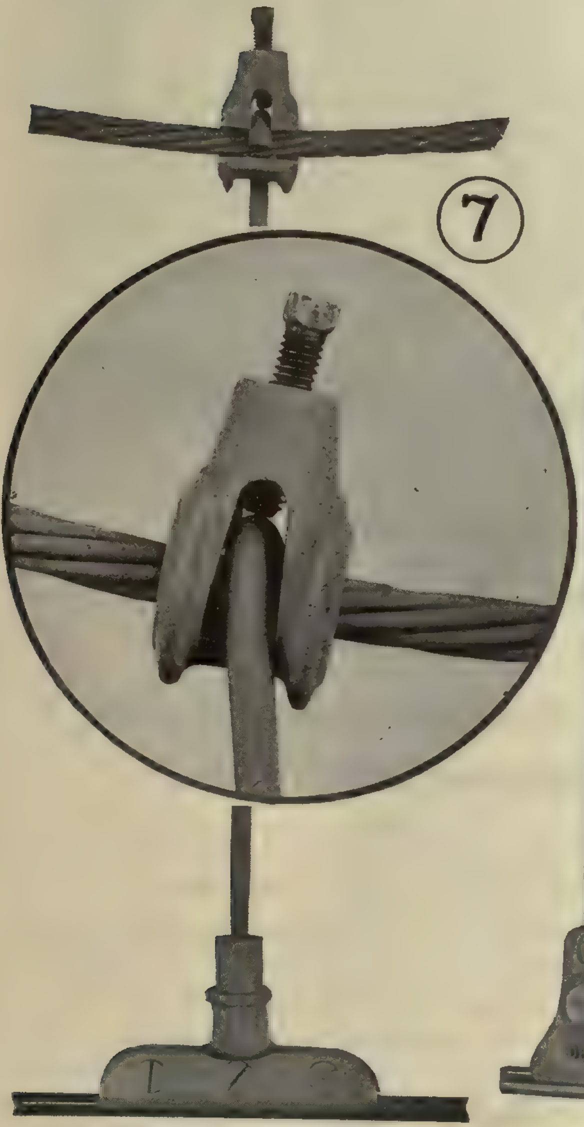
10. Drew Adjustable Pull Off Links

This casting is held to the pipe by U-bolts making a remarkably strong clamp. Because the U-bolt is wrapped around the pipe it provides a much better method of clamping than when set screws are used.

11. Drew "T" and Cross Connection

Applied to conductors by loosening and tightening the half inch standard carriage bolt. After connections are made conductors are held in a right angle position. Not having to take the bolt out of clamping casting, eliminates possibility of dropping parts, thus saving time in installation.

DREW ELECTRIC & MFG. CO.
Cleveland, Ohio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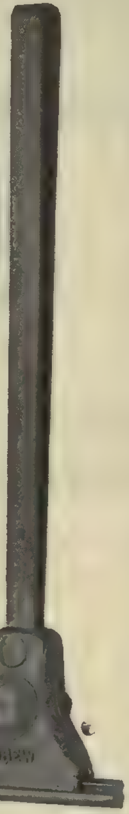

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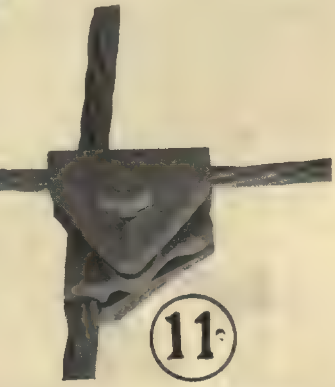

11

PEREY TURNSTILES

at the Fairmount Park Station of the Fairmount Park Transit Co., Philadelphia, Pa.

Mass Transportation is the crying need of successful present day electric railway operation.

Wherever car riders are handled regularly in large numbers, Perey Turnstiles are a vital necessity because they enable the railway to handle greater numbers in the least amount of time and are in no way responsible for car delays in terminals while loading.

Continuity of service coupled with maximum loadings are only two of the principal advantages of Perey Turnstiles.

100% fare collection is one of the most important outstanding advantages of Perey Turnstiles.

These and other excellent features have been responsible for the choice of Perey Turnstiles by the Fairmount Park Transit Company at its Fairmount Park Station.

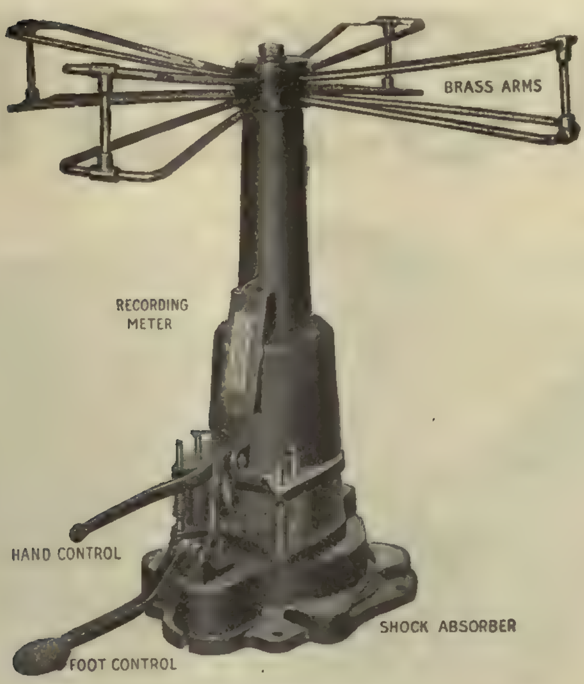
A visit to our Booth Nos. 313-315 will give us an opportunity of proving to you the reason why Perey Turnstiles are a vital necessity on your property.

Don't fail to see our exhibit.

See Our Exhibit Booth Nos. 313-315

PEREY MANUFAC

30 Church Street,



PEREY TURNSTILES

THEY have been found to be the only satisfactory way to handle large crowds in mass transportation. These turnstiles have saved thousands of dollars in fares that would never have been collected by the old-fashioned way.

They are the only accurate method of counting fares.

PEREY TURNSTILES are becoming more popular every day because their capacity for handling crowds is unlimited.

Every terminal should be equipped with them.

Man labor not necessary, as the Perey Turnstile can be successfully operated by women.

Submit us your requirements and we will gladly furnish you an estimate covering your needs.

Atlantic City Convention

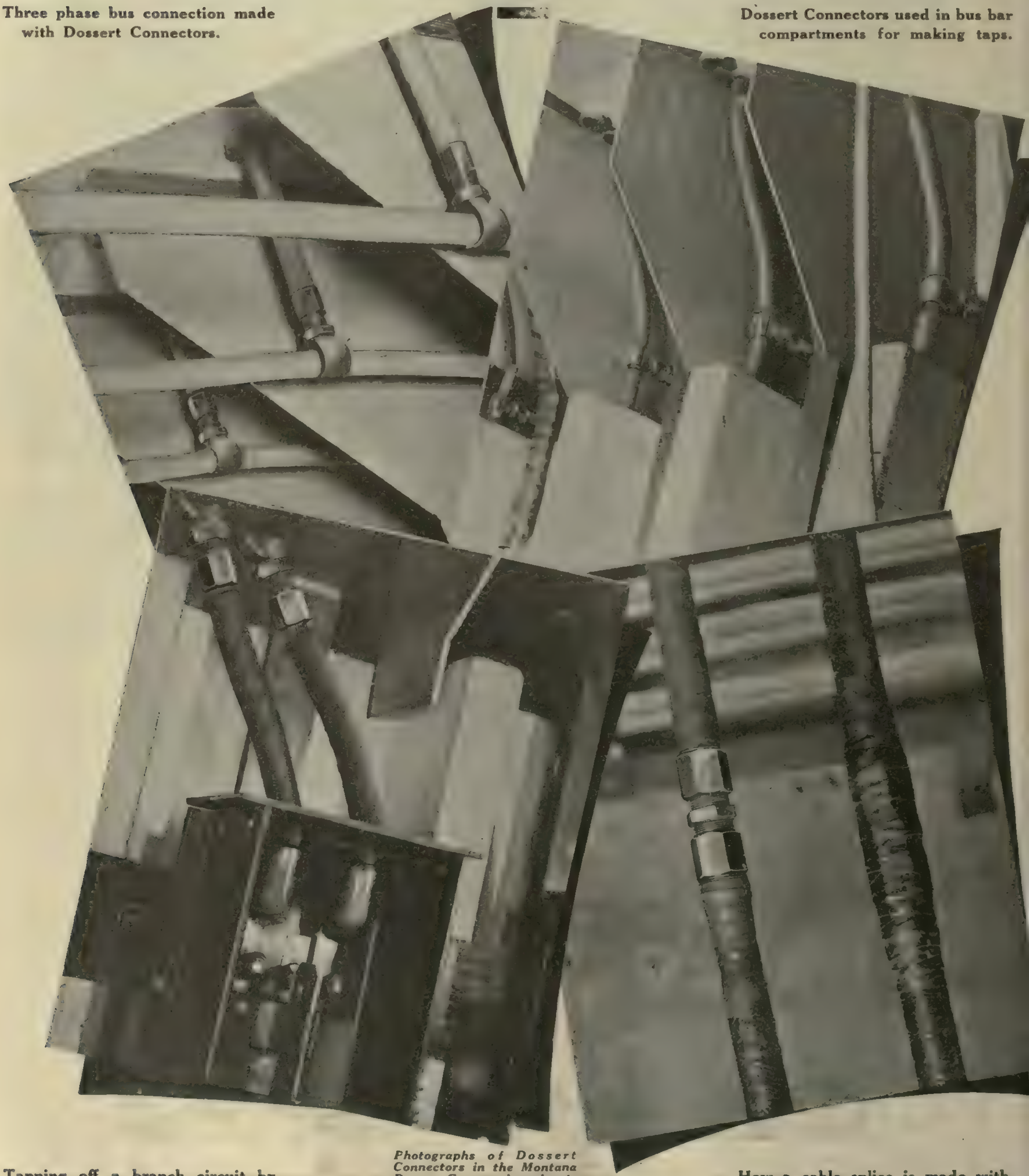
TURING CO., Inc.

New York, N. Y.

DOSSERT

Three phase bus connection made with Dossert Connectors.

Dossert Connectors used in bus bar compartments for making taps.



Tapping off a branch circuit by means of Dossert Connectors.

Photographs of Dossert Connectors in the Montana Power Company's plant, Great Falls, Montana. Courtesy of Mr. H. H. Cochrane, Chief Engineer.

How a cable splice is made with Dossert Connectors.

CONNECTORS

Used in the Great Power Plant that furnishes energy to the electrified divisions of the

Chicago, Milwaukee and St. Paul

Every unit in the chain of energy generation, distribution and application must be the best in the system that pushes the giant electric locomotives over the C. M. & St. P. Rock Mountain Division.

In the power plant at Great Falls you'll find Dossert Connectors used for cable junctions or splices.

Note the variety of uses illustrated in the photographs. Yet these are but a small measure of the wide range of applications. Any ordinary connection from power station to safety car may be made with standard types; special types will be designed to meet unusual conditions.

Mr. Cochrane, Chief Engineer of the Montana Power Company finds Dossert Connectors great for convenience and economy. These advantages are available to you.

Your first move is to send for Catalog No. 15

DOSSERT & COMPANY

H. B. LOGAN, President

242 West 41st Street, New York

A Chapter in *Safety Car* Development

In 1918 this company was organized for the purpose of furnishing and financing Safety Cars.

Since that time we have successfully furnished and financed more than 500 complete Safety Units.

This accomplishment is, in a large measure, due to our thorough experience, and our knowledge of conditions and problems confronting the electric railway manager today.

This knowledge of the needs—this understanding of the requirements of the industry—our enthusiasm and our faith in the economy and usefulness of the Safety Car, has enabled us to render real Service to the industry.

During the past two years our staff has always been ready to give assistance, *and did give assistance,* wherever it was needed.

Whether it was to appear before legislative committees, city councils, state commissions or labor organizations—wherever the introduction of the "life-saving" Safety Car was opposed, one or more of our trained and experienced staff responded to the call.

NATIONAL SAFETY CA

S

OUR ORGANIZATION

Geo. H. Tontrup, President
Nic LeGrand
C. W. Rhoades
E. T. Bronenkamp, Vice-President
Thos. Simons

EASTERN REPRESENTATIVES:
National Railway Appliance Co.
(Hegeman & Castle)
50 East 42nd Street, New York.

SOUTHEASTERN REPRESENTATIVE:
E. A. Thornwell,
1026 Atlanta Trust Bldg.,
Atlanta, Ga.

PACIFIC COAST REPRESENTATIVE:
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.

And as we progressed, refinements were made in the carbody and in the truck; our staff was augmented; the circle of our usefulness widened; our capacity to give real service increased.

Complete data, detailed information and figures, relating to every angle of Safety Car introduction and operation, was always to be obtained from us for the mere asking and without the slightest obligation.

The unsettled conditions of the past year have made the financing a little difficult; strikes have greatly delayed shipments, but we can assure our friends unhesitatingly that we can and will render helpful service whenever we are called upon to do so.

We have devoted two good years in faithful and energetic exploitation of the Safety Car. The good results accomplished were worth the effort.

Our faith in the Car was strong from the outset—our faith in it is stronger today.

The economy and usefulness of the Safety Car is more thoroughly appreciated today than ever. It is daily growing in favor and is more and more receiving the recognition that its merits deserve.

We have received much encouragement from the industry and this is gratefully acknowledged.

The generous support accorded us by our friends is deeply appreciated.

No matter how vexing your local problem may appear to you, we can help you.

We are organized for *service*—let us serve *you*.

& EQUIPMENT COMPANY

Louis

WE REPRESENT

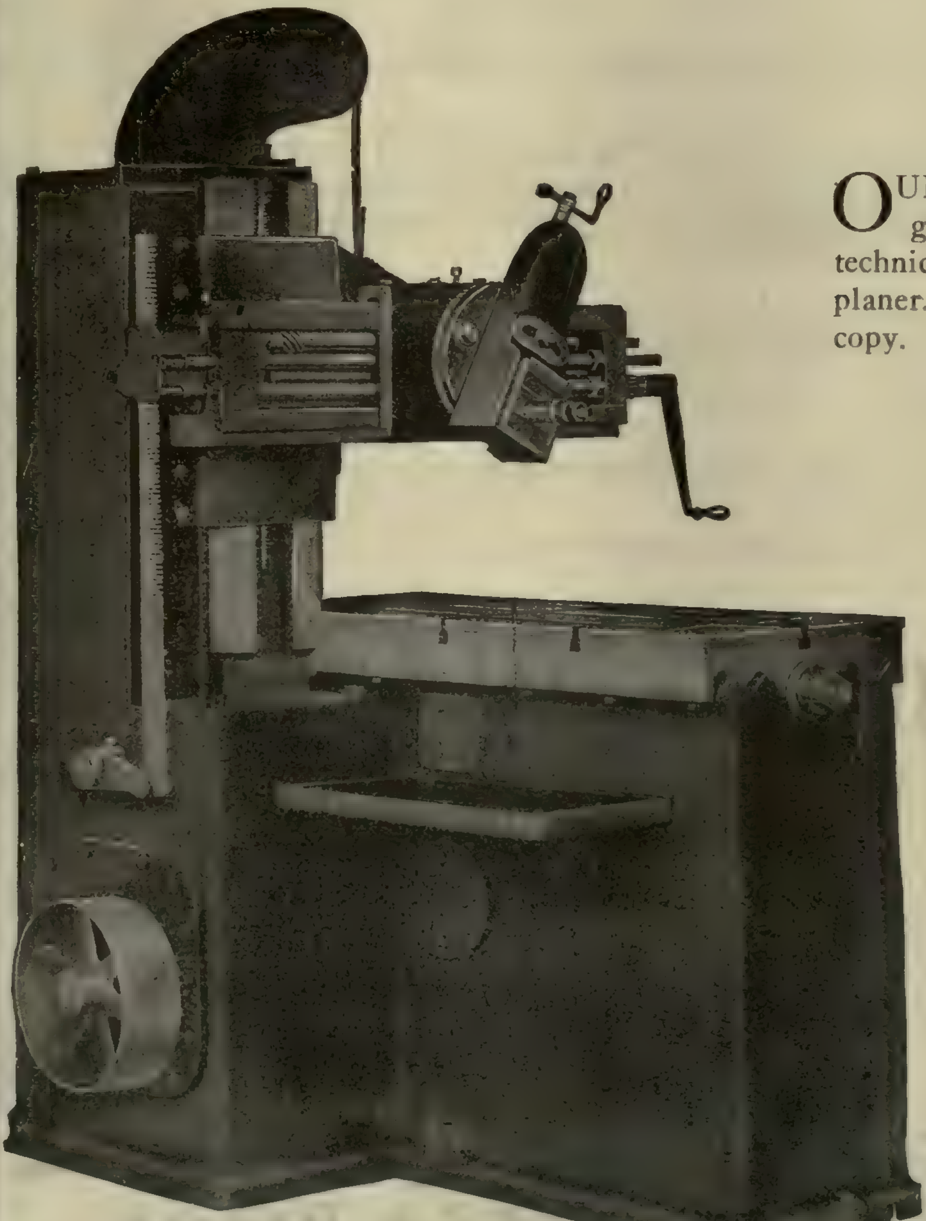
Cincinnati Car Company	Safety Cars
Hale & Kilburn Corporation	Car Seats
Keyes Products Company	Nevasplit Headlinings

Buying Two—At the Price of One

Practically, that's exactly what you are doing when purchasing a LYND-FARQUHAR Open Side Planer. This one machine both planes and shapes.

It will shape a wide variety of work equally as capably as a special duty machine. It will plane faster and at less cost than the large planer. In fact, much better work can be obtained because the entire casting and the planing operation is within clear view of the operator at all times.

The machine contains all the principal features of the planer and the shaper, and has many important improvements common to neither.



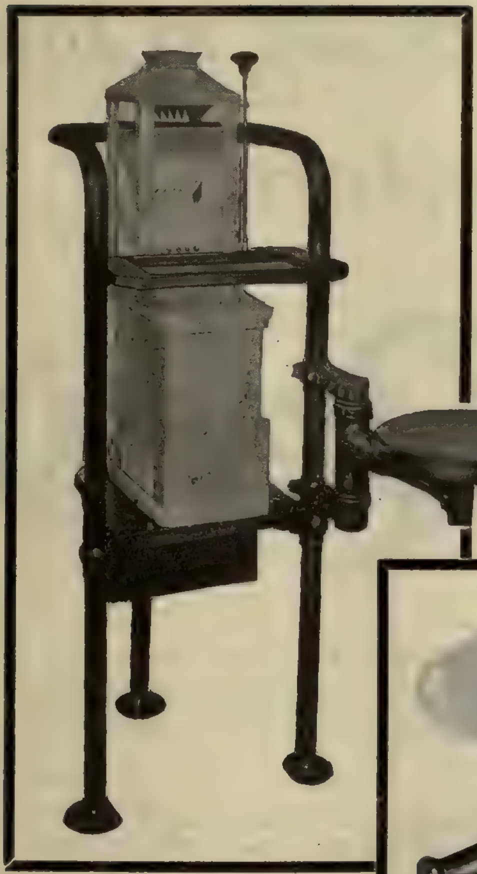
OUR catalogue will give you some technical data on this planer. Send for a copy.

LYND-FARQUHAR COMPANY

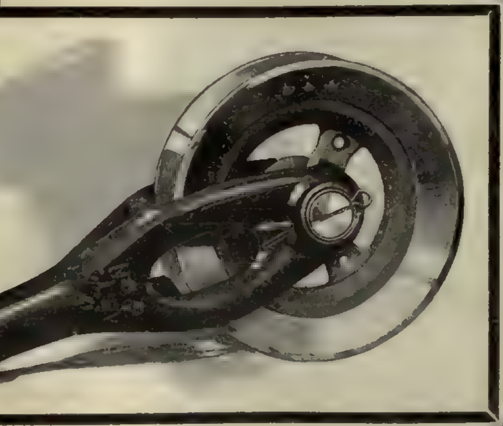
Also builders of Wall Radials, and have a large up-to-date stock of modern new and used machine tool equipment.

Boston 9, Mass.

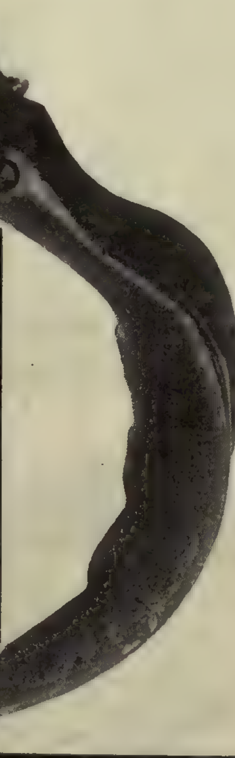
Quality Equipment
for Progressive
Electric Railways



1 Conductors' Seat



2 Trolley Harp



3 Sleet Cutter

1 This conductor's seat is made of malleable iron castings—built strong and substantial for the hardest kind of service. Standard design is made to fit one inch pipe stanchion but can be supplied to fit *any* size. Wooden seat folds out of way or detachable seat can be used.

2 Our No. 2 Harp is properly designed to meet with all the condition of the overhead.

Has 1 in. hollow axle, carrying grease-good contacts.

Wheel is machined inside and outside and is balanced, which we consider is the most important feature.

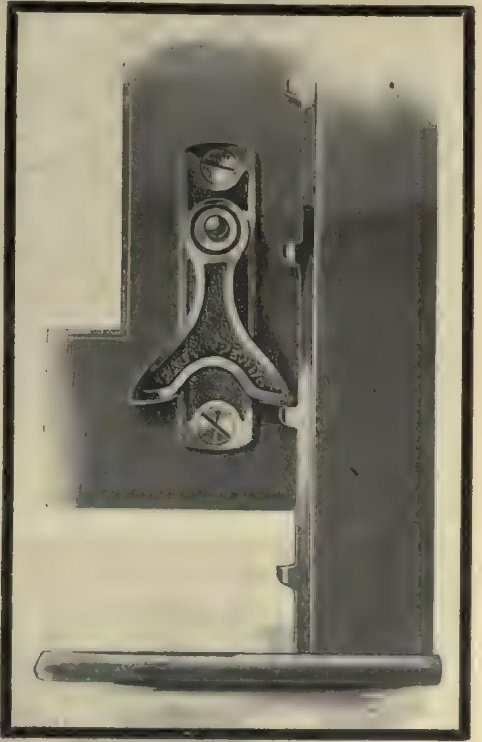
3 This Sleet Cutter is made in both malleable iron and brass. It can be easily attached without removing the trolley wheel. It can't injure the wire and the safety rope fastening prevents the cutter from falling off and being lost.

4 Note the simple, sturdy construction of the Cleveland Window Catch. No springs—no delicate parts to get out of order and cause trouble. It prevents the window from falling and eliminates broken glass and cracked sashes.

We also have two designs of trolley bases in use on several roads, one having a ball bearing fulcrum applicable to low over-head lines.

Write today for a sample order of any or all of the equipment listed here. Or if you prefer, ask us to send you complete data and prices. No obligations, so write today.

4 Cleveland Window Catch



ADVANCE MANUFACTURING & TOOL CO.

Cleveland Ohio U. S. A.

A Study in Joint

Applying

Resil

Cause—
Bad Foundation

Effect

The Dayton Rail Joint Booster is the quickest, most economical and effective means of reclaiming track, good in all respects, except the bad joints.

When a low joint develops the pavement and substructure immediately begin to deteriorate. Each succeeding blow from the dropping wheel supplements the damage already made, and adds a little more.

When a low joint develops, install a Joint Booster, save the hammer blow on the receiving rail, which will reflect its saving through the resiliency of the Joint Booster on your rolling stock, and on the temper and good will of your patrons.

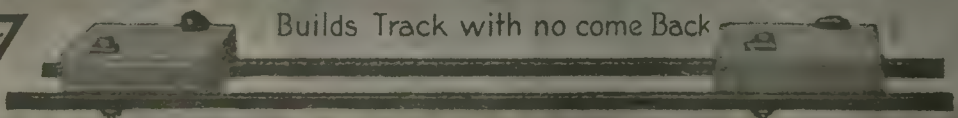
Just as you carry other material in stock for repairs, carry Joint Boosters as well. They can be installed quickly and without interruption to traffic. Ten hours maximum is sufficient time to open joint, install Booster and close up paving.

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

The RESILIENT RAILWAY TIE

DMT Co

Builds Track with no come Back



DMT Co

Reclamation

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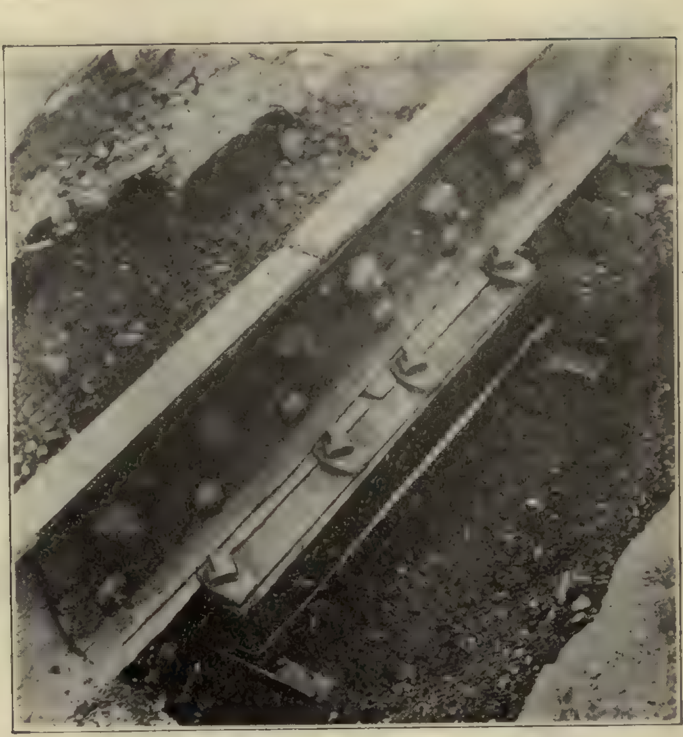


Cure—

Resilient Joint Booster with Concrete Foundation

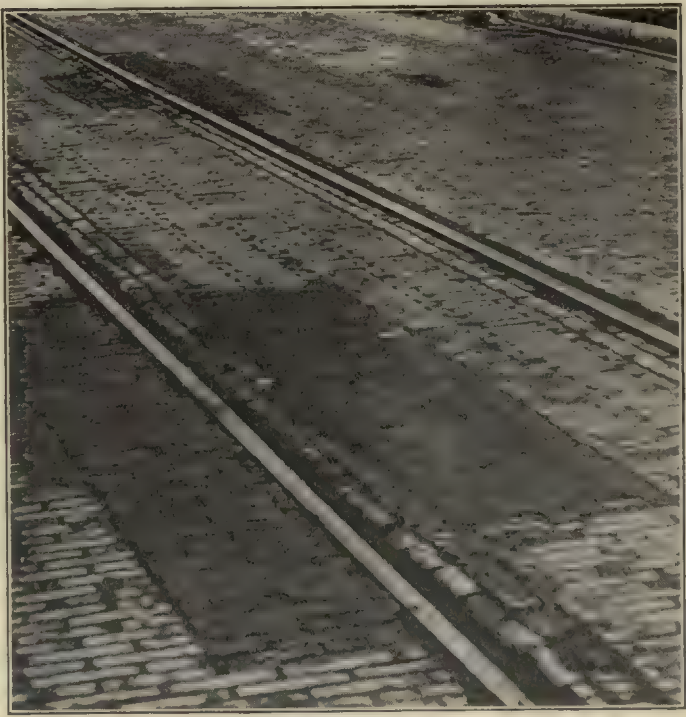
The simplicity of installation is shown by the photographs.

First remove the paving, cut away the ends of the ties supporting the joint, clamp Joint Booster to base of rail, tamp slightly damp concrete under Booster for a depth of a few inches, maintain traffic to assist in seating Booster in concrete, weld base of rail to steel plate on Booster and replace the paving.

If the rail has been badly cupped build up cupped portion with weld and grind down to smooth surface.

The old saying "a stitch in time saves nine" can well be applied to bad joints. A Joint Booster applied in time, will save many a dollar in maintenance and prolong the life of your track.

Order a dozen Boosters now and ascertain for yourself what they will do. Possibly that large outlay for new track can be postponed and seven to ten years added to the life of what you have.



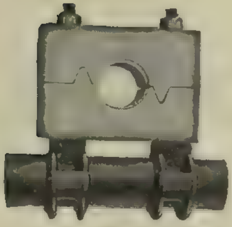
Effect

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING DAYTON, OHIO

ERIE

INTERCHANGEABLE FITTINGS

Should Be Standard With Every Electric Railway



All ERIE Fittings are made up of two or more castings, Male and Female, and all are interchangeable.

Think what a complete stock of interchangeable fittings would mean on your property. Never any delay—infinite number of combinations—fittings that can always be adapted to your needs.

You have hundreds of uses for ERIE Fittings in your power houses, substations and on your transmission. They will save 50% in time of installation and in maintenance. They have but one bolt, and they grip better.

Get the ERIE Catalog and stock up for future needs.

Erie Electrical Equipment Company, Inc.

Main Office and Factory: Johnstown, Pa.

District Offices:

1124 Metropolitan Life Bldg., Minneapolis, Minn.
217 International Life Bldg., St. Louis, Mo.
311 Wabash Ave., Terre Haute, Ind.
549 Mission St., San Francisco, Cal.
210 I. W. Hellman Bldg., Los Angeles, Cal.
61 Broadway, New York, N. Y.
1055 Old Colony Bldg., Chicago, Ill.
261 Franklin St., Boston, Mass.
983 The Arcade, Cleveland, Ohio.
303 Penfield Bldg., Philadelphia, Pa.
Gas & Electric Bldg., Denver, Colo.
325 Yesler Way, Seattle, Wash.
70 Honor Oak Road, London S. E. 23, England.
Kirkegaten 20, Christiania, Norway.
950 Ellicott Square, Buffalo, N. Y.

Headquarters

for information about the latest developments in the manufacture and installation of Electric Wires, Cables and Cable Accessories for overhead and underground transmission and power house service will be at Booth 388 A.E.R.A. Convention. May we have the pleasure of meeting you there?

Standard Underground Cable Co.

General Offices, Pittsburgh, Pa.

Branch Sales Offices:

Boston, Philadelphia, Washington, Chicago, St. Louis, Los Angeles
New York, Atlanta, Pittsburgh, Detroit, Seattle, Salt Lake City
San Francisco

For Canada: Standard Underground Cable Co. of Canada, Limited.
General Offices and Works, Hamilton, Ont.

You Can Minimize Overhead Repair Work

and successfully cut maintenance costs if you turn to

The Macallen Line

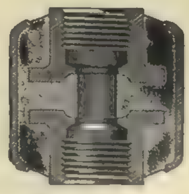
of strain insulators, hangers, splicing ears, crossings, and other overhead material.

They are "specialty" products, designed and built to make "Macallen" the standard on American railways.

It will pay you to write for information and prices.

The Macallen Insulating Joint

Adopted by principal air brake manufacturers as part of their standard equipment. Also insulates steam pipes, etc. Shell is seamless drawn steel, nipples are machined from steel rod, and insulating material is Macallen Vulcanite Compound, not affected by heat or oil—practically indestructible.



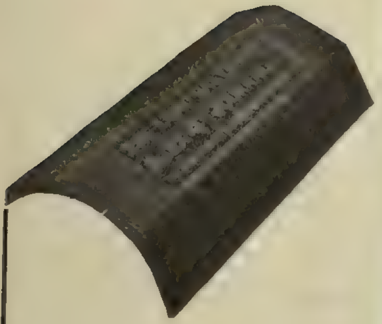
May We Send Our Catalog?

TRADE MACALLEN MARK.

The Macallen Company

Macallen and Foundry Sts., Boston

TRADE MACALLEN MARK.



Ajax Car Brasses—have been leaders in their field for 40 years. Made with the same precision and accuracy as a car wheel.

Ajax Check Plates—Made of our Perfect Bronze, which will bend before it will break. Outlast all other check plates.

Ajax Bull Bearing Alloy—The most economical and dependable lining for brasses and axle bearings. Lasts longer and runs cooler; costs less.

Specify Ajax products for new equipment and repairs

THE AJAX METAL COMPANY

Main Office and Works: Philadelphia, Pa. **Established 1880** **Southern Plant: Birmingham, Ala.**

Self Lubricating—Slight Maintenance

Hensley Trolley Wheels

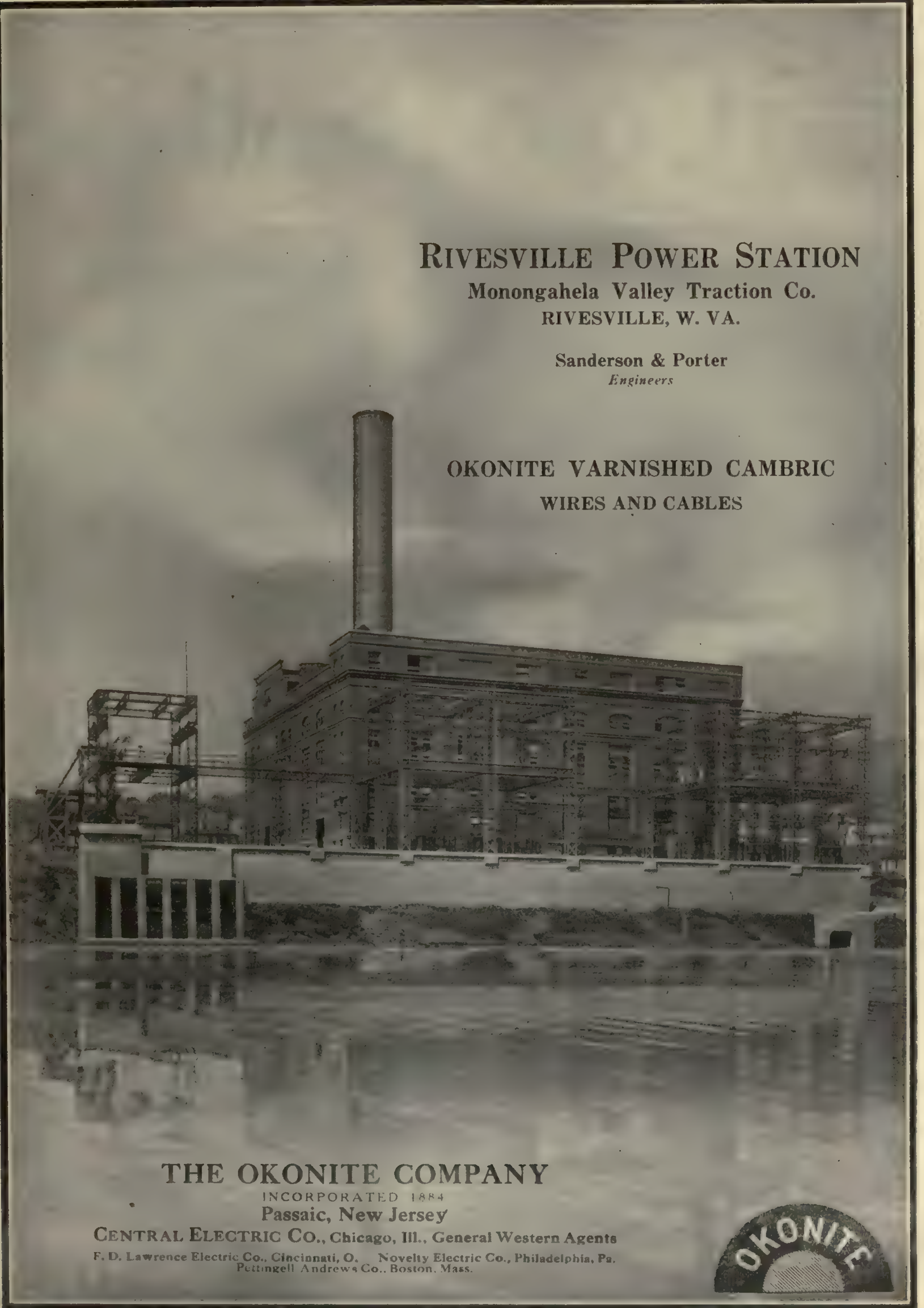
have a positive force-feed lubricating system.

A grease containing cavity, from which the lubricant is fed to the wheel hub, requires only 3 seconds to fill.

It is not necessary to touch a screw or pin in filling the cavity.

These wheels are suited to all speeds and service

Hensley Trolley & Mfg. Co.
Detroit, Michigan



RIVESVILLE POWER STATION

Monongahela Valley Traction Co.
RIVESVILLE, W. VA.

Sanderson & Porter
Engineers

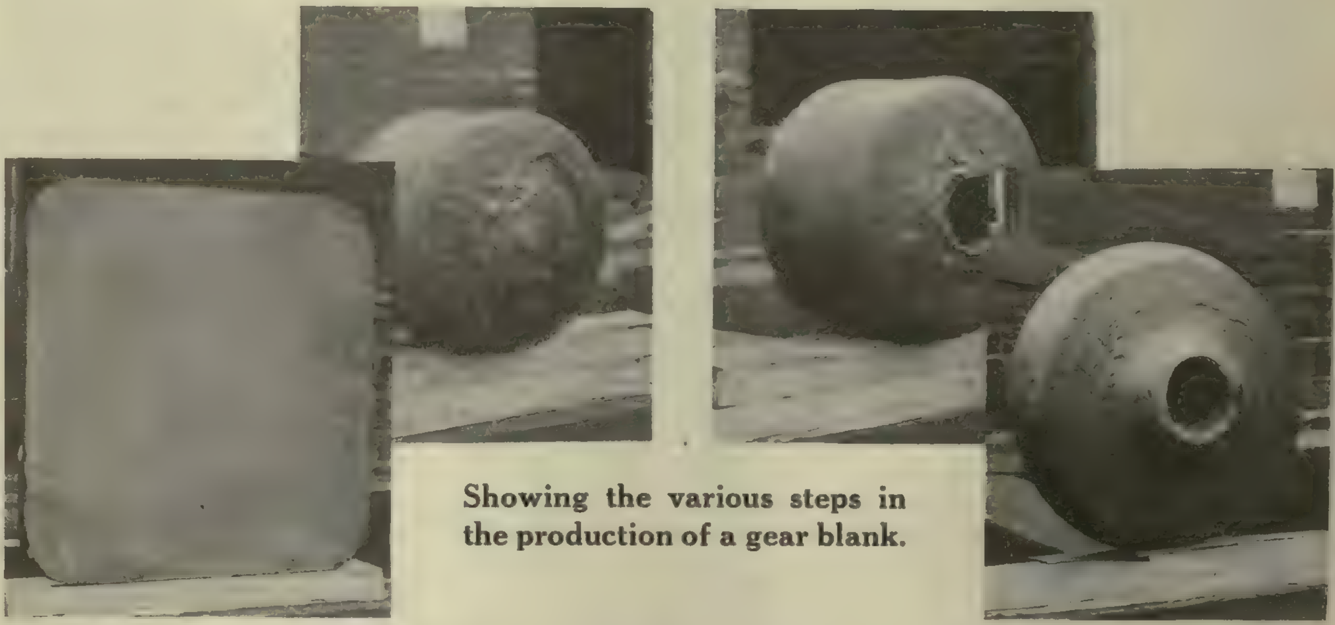
OKONITE VARNISHED CAMBRIC
WIRES AND CABLES

THE OKONITE COMPANY

INCORPORATED 1884
Passaic, New Jersey
CENTRAL ELECTRIC CO., Chicago, Ill., General Western Agents
F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Philadelphia, Pa.
Pettingell Andrews Co., Boston, Mass.

Okonite products will be exhibited at Booth 500, *Atlantic City, October* 11-15.

Come and See



Showing the various steps in the production of a gear blank.

ROLLED AND FORGED

Come and see every step in the process—see how the metal is not only rolled but *forged*—thus giving the steel an unusually thorough working which puts the completed piece in the best possible condition to withstand the most severe requirements of service.

The actual sight of the samples will give you a far better impression and understanding of why circular sections such as gear blanks, small wheels, turbine discs, etc., made by our special method are superior in every way.

MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY

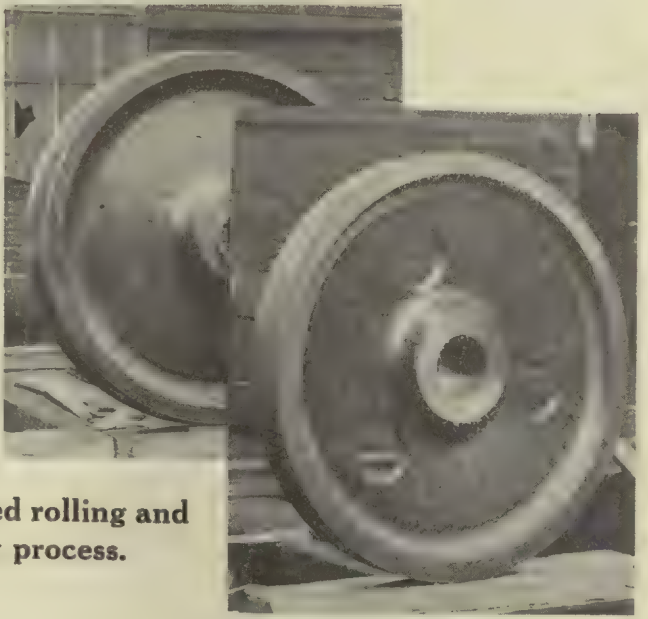
General Sales Office, Widener Building, Philadelphia, Pa.

District Sales Offices
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia
Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis

Sole Export Representatives
Consolidated Steel Corporation, 165 Broadway, New York
All export inquiries should be sent to this address

This Exhibit

—by our combined rolling and hydraulic forging process.



CIRCULAR SECTIONS

We want you to visit this Exhibit at Spaces 562, 563, 546 and 565, There will always be someone on hand to give you a full explanation of the various operations and the results obtained.

If you cannot get to Atlantic City, it will pay you to follow our advertisements in this Journal from October 30th to November 27th, stating the how and why of each step.

MIDVALE STEEL AND ORDNANCE COMPANY
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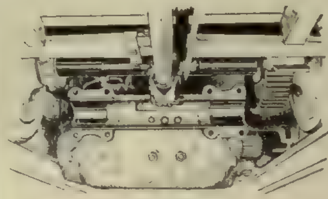
Nuttall Helical Gears

A PROVEN SUCCESS

HISTORY



An idea in 1914—an evolution in a well established, conservative field in 1920. That is the story of Nuttall Helical Railway gears.

The idea of applying the helical gear to this service was conceived in 1914, and from this time on, the development was rapid and accurate. Special machinery and tools soon produced a gear that was far removed in design and quality from the original experimental models.

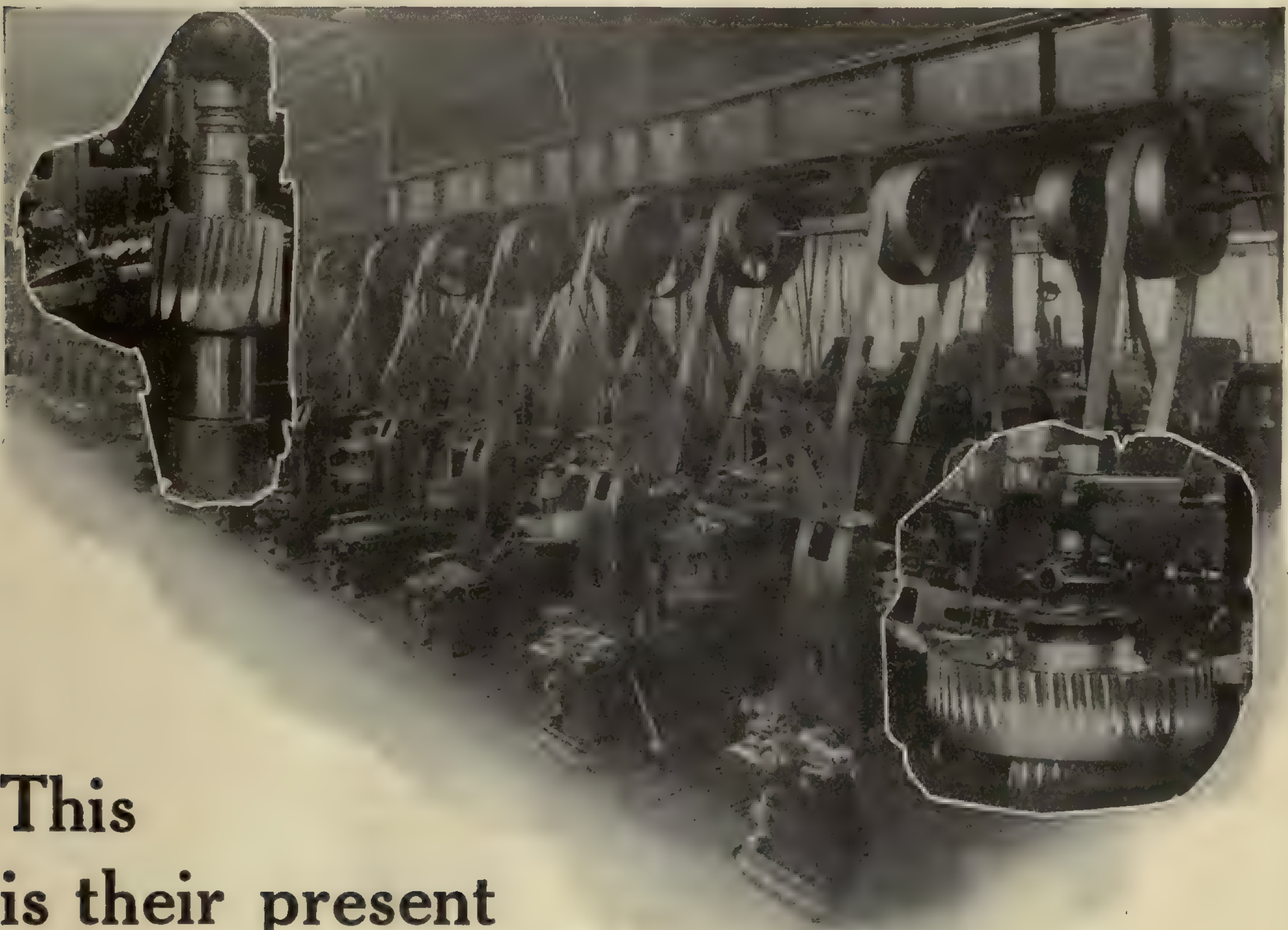
By 1915 the first installation of the "perfect gear" was made, and when it had completed 284,248 miles of service, it was removed so that the executives of the nation's railways could see it at the 1919 A. E. R. A. Convention. Its principle was correct and its adoption was immediate. By its use vibration was eliminated and the noise and destruction of spur gears vanished in an evolutionary change in the railway operating art.

Today 200 companies are using 12,000 of these gears. Westinghouse Railway motors are equipped with Nuttall Helical gears as standard parts, and the first Helical gear and pinion are still in service with a record of over 350,000 car miles and show no sign of weakening or becoming noisy.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Nuttall Helical Gears

A PROVEN SUCCESS



This is their present

Five years of investigation, trials and tests led up to the application of Nuttall Helical Gears—the proven success.

Large additions have been made to our Helical Gear hobbing machines.

The illustration shown above is of a battery of new helical hobbers.

This battery knows no eight-hour day; it works day and night because its operation is dependent upon the railway operator's demand for Nuttall Helical Gears.

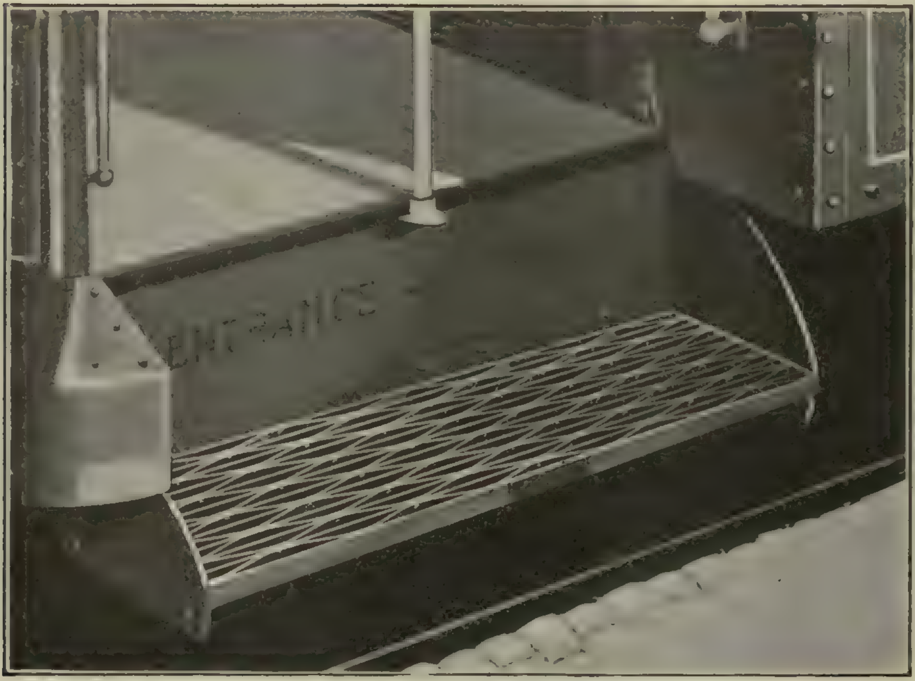
R.D. NUTTALL COMPANY
PITTSBURGH AGMA PENNSYLVANIA

IRVING SUBWAY
(PATENTED) TRADE MARK
THE FIREPROOF VENTILATING FLOORING

IRVING SAFSTEP

TRADE MARK
(PATENTED) REG. U.S. PAT. OFF.

ABSOLUTELY NON-SLIPPING ALWAYS



Here's car step accident insurance at minimum cost, that you can build right in on your present equipment—a safety step with the following unique combination of advantages:

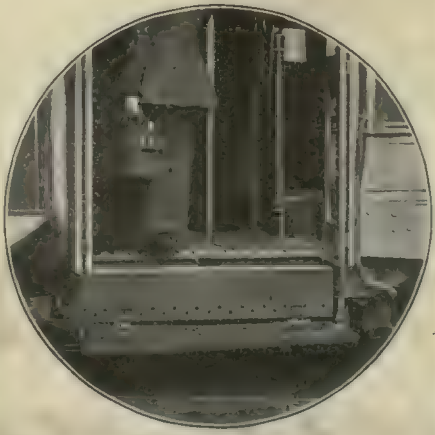
No lead or abrasive insets to wear out or work loose.
Light in weight, firm but elastic, never "rattley".
All steel, as durable as the car itself.
Clean, because dirt falls through.
Less dirt tracked into the car.
Hastens loading and unloading.

Absolutely non-slipping, even with rain, snow or ice on it.

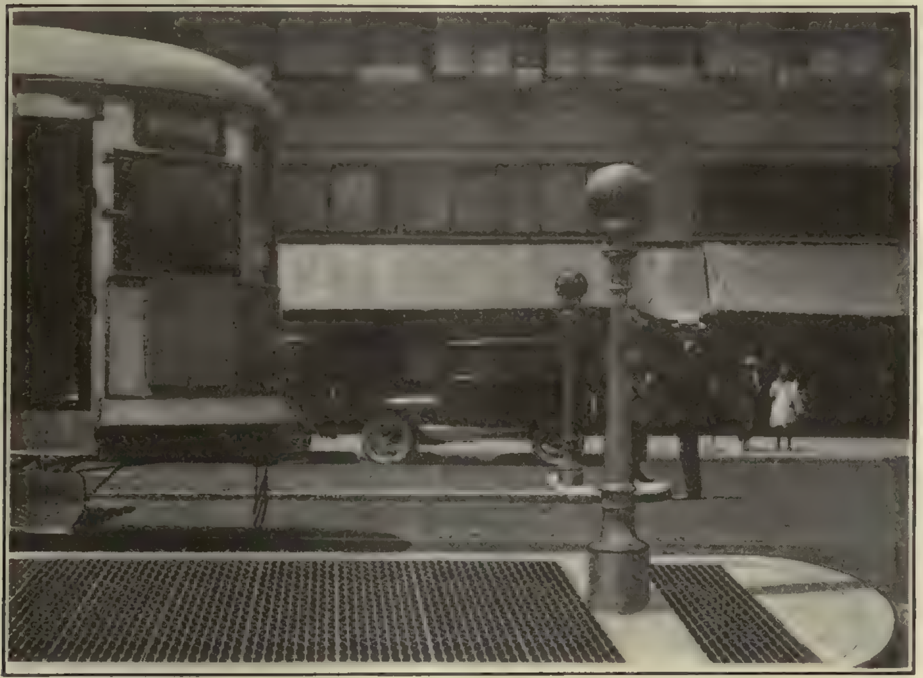
"Safsteps" are made to fit any style or type of car, and are easily installed.

Write for Catalog 2A28, sending a rough sketch of the weight and dimensions of your car steps.

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y., U.S.A.

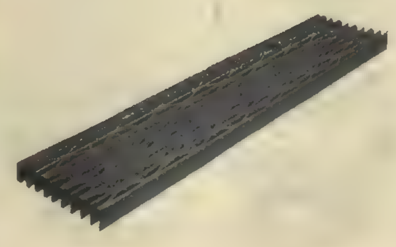


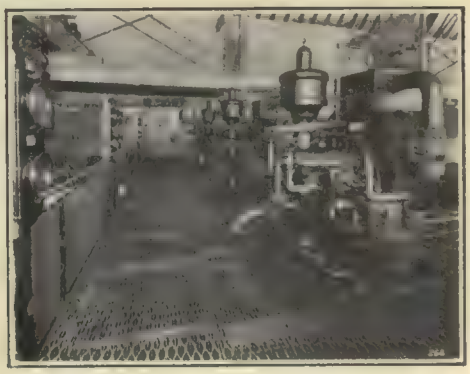
IRVING SUBWAY
(PATENTED) TRADE MARK
THE FIREPROOF VENTILATING FLOORING



For loading platforms or "isles of safety", for covers over subway ventilation openings, for station platforms, and for floors and galleries in power plants—**Irving "Subway"** is the preeminently economical open flooring. It is absolutely and permanently safe and non-slipping—outdoors, even with rain, snow or ice upon it—indoors, even with oil or grease upon it. All steel, solidly riveted up, each panel is a unit that will not warp, twist or sag. The exclusive **Irving** truss construction makes **Irving "Subway"** the lightest, strongest grating or open flooring, withstanding shock or pressure that would destroy any other grating or even a solid floor plate. Convenient panels make installation easy. You pay only once for a floor of **Irving "Subway"**—it is practically indestructible. And the price is surprisingly low. Write for Catalog 2A28, showing manifold uses.

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y., U.S.A.





The Most Economical Gear Case for One-Man Safety Cars

combines lightness with durability

Low service cost is made possible because of the light weight, strong construction, interchangeability and the absence of seams and rivets.

Weight 50 lbs.

For W. H. 508 Motor
used on
One-Man Safety Car Equipment

Chillingworth Brackets are specially designed for every type of suspension to provide strength and durability.

Accurate fit thus minimizing your vibration difficulties.

Strength and quality are not sacrificed for size. The construction is of the same high standard as that of the larger cases.

Chillingworth Manufacturing Company

Jersey City, N. J.

Sales Department: Thayer and Company, Inc., 111 Broadway

Visit our Booth 509—Atlantic City Convention

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Columbia Products

Columbia Products are Quality Products because they have for twenty-nine years, and still are manufactured under the policy of "right goods, quick delivery, moderate profit."

Columbia Products are manufactured on a heavy production basis from the best materials obtainable, thus giving the individual purchaser the advantages of buying small quantities at exceedingly moderate prices.

Twenty-nine years of experience in putting out practical shop tools, equipment and supplies has brought to this company a prestige that is second to none in the electric railway field.

We have in our factory dies, jigs, templets, moulds and equipment for turning out immediately practically all types of electric railway equipment parts that have been in use for the past decade.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

COLUMBIA

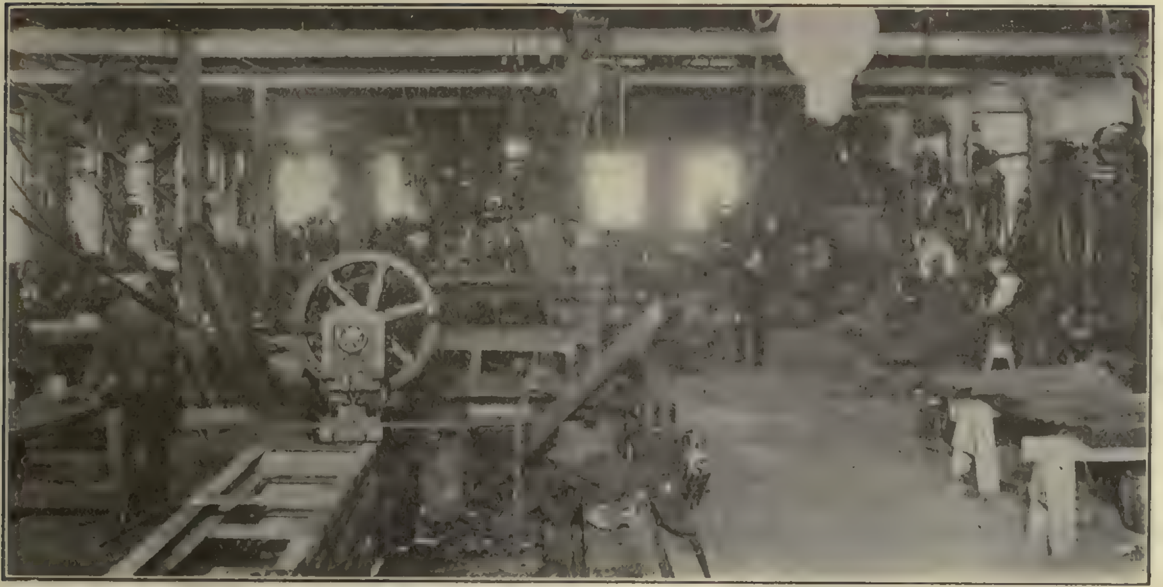
Columbia Service is a specialized service, as the pictures on these two pages will bear out.

We are not dependent on the other fellow.

Our own brass and iron foundries, forge plant, welding plant, babbitting plant and machine shop which are equipped with power hammers, bulldozers, lathes, drills, boring machines and miscellaneous specialized tools enable us to give you the very best of service.

Columbia Machine Works &
Atlantic Ave. & Chestnut

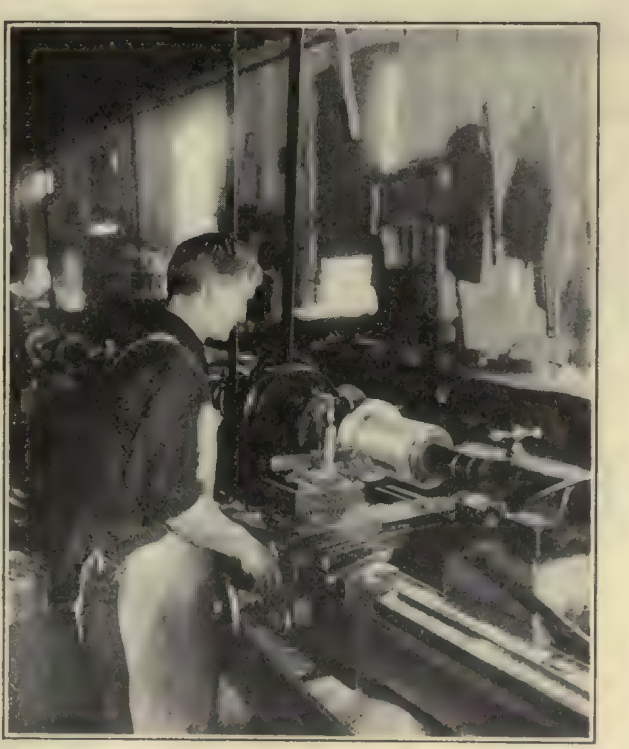
A. A. GREEN, Sales Mgr., 50 Church St., N. Y. C.
E. ALLISON THORNWELL, 1026-7 Atlanta Trust Bldg., Atlanta, Ga.
J. L. WHITTAKER, 141 Milk St., Boston, Mass.
F. F. BODLER, 903 Monadnock Bldg., San Francisco, Calif.



SERVICE

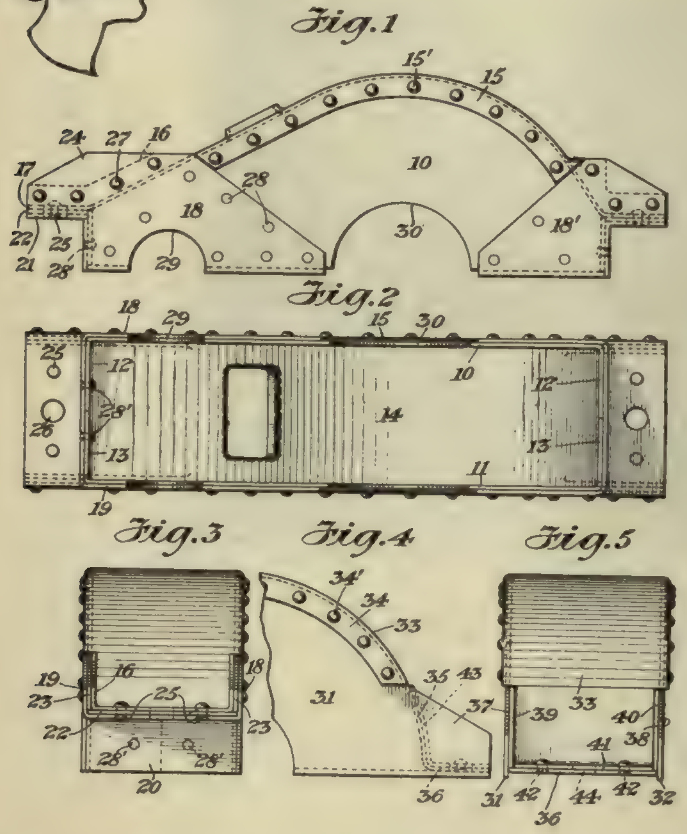
Columbia Service insures the fullest co-operation between the manufacturer and the railway operator because every order regardless of size and cost is given the most careful attention.

Whether you place a rush order for 1000 Columbia gear cases, as one large railway has recently done, for a Columbia axle straightener or merely for a dozen trolley wheels, you will get prompt deliveries, the highest quality of workmanship and at a moderate price.



Malleable Iron Company
St., Brooklyn, N. Y.

W. McK. WHITE, 6712 Cornell Ave., Chicago, Ill.
Ernest Keller, Frank Hedley, Brooklyn, N. Y.
J. G. Buehler, Pres. and Treas.
L. O. Smith, V. P. & Gen. Mgr.
Chas. Buehler, Secy.



Columbia Gear Case

Columbia Quality Sheet-Steel Gear Cases

Reinforced suspension in Columbia sheet steel gear cases enabling them to "stand the racket" is obtained by interlocking and welding together the sides, cover and reinforcements so that a channel shaped suspension is built up to provide increased strength.

Here is a gear case whose brackets or lugs have three thicknesses of steel on each side and across the end thus strengthening it to stand severe shocks and stresses from the jolting of the car over crossings, special trackwork and track in run-down condition. As the sides and top are extended to form this channel the weight of the gear case and any strains resulting from vibration or shock are transmitted through uninterrupted supports and not through joints which may loosen at seams or through the shearing off of rivets. No bumping or scraping over pavement or roadbeds where the clearance is small will ever crack these brackets because they have been especially designed for the hardest usage.

Increased strength at the vulnerable points is obtained by extending the sides and cover so as to form the suspension members and reinforcing these with sheet steel brackets and plates so shaped as to interlock with the sides and cover. All parts are spot-welded together and in addition all edges along the entire length are spot-welded. The cover is notched and bent so as to provide flanges in two directions all along the edges, thus giving additional strength.

The Careful Workmanship Put
Is Reflected In Each

Columbia Machine Work

Atlantic Avenue and Chestnu

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Columbia Trolley Wheel

Quality Trolley Wheels

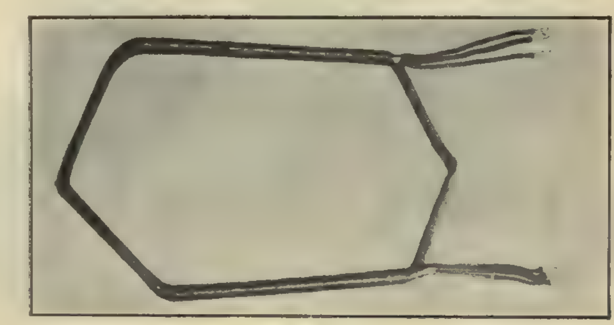
are made in 4, 5 and 6 inch sizes and to your special requirements. Special attention has been given in the selection of material only such being used as will give long wear and good lubrication.

Our sleet cutting trolley wheel stands up in the hardest of sleet storms without aid of auxiliary sleet cutting or scraping devices. Order them now for the winter while deliveries are good and stocks are built up.

Columbia Bearings

Columbia-Made Coils are Quality Coils

They are specially designed and wound for rewinding old armatures because unusual care is needed. Additional insulation is always necessary at corners and between leads where the clearance with core is small. In addition the large radius bends give greater flexibility. Cores that have been opened up during heavy service, and have laminations that are bent or that have projections caused by bumping armatures against pole faces can best be wound with Columbia-Made Quality Coils because these conditions are taken into account in their manufacture.



Columbia Coil

Columbia Quality Bearings

for both axles and armature are made from the bar to the finished product right in our own plant. Columbia has every facility for bearing manufacture and our dies, moulds and equipment enable us to turn out practically every type of bearing for every motor or axle in record-breaking time. If you do not already know this, one trial will convince you.

Into Every Columbia Product and Every Detail

& Malleable Iron Co.

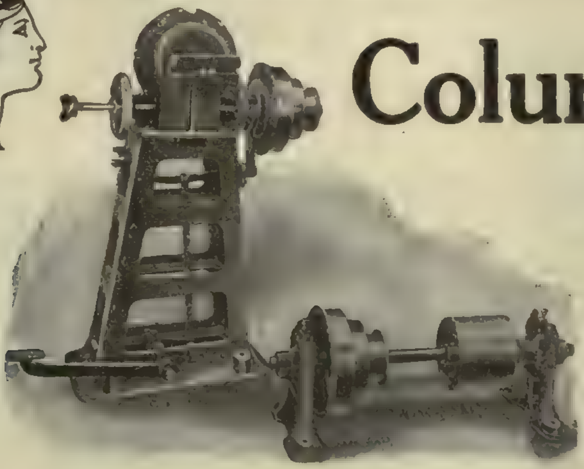
Street, Brooklyn, New York

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Columbia Shop Tools

Will Effect Large

Making Electric



Columbia Field Coil Winding Machine

A slap bang-up A-1 repair shop is absolutely necessary to cut down operating expenses.

This means that old dilapidated tools and equipment of twenty years ago cannot possibly fit into the scheme of trying to make repairs quickly and cheaply on a heavy production basis.

The best heads in the industry are throwing out all the old dilapidated tools and installing shop tools and equipment that will enable the management to keep the rolling stock in better condition and to give longer service.

Keep your eyes on Columbia Shop Tools, the Quality Group, they are being specified in large quantities and are being installed in the latest and most uptodate shops in the country.

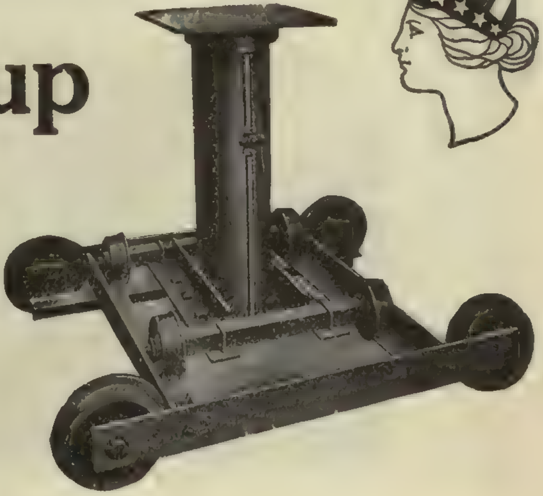
Columbia Coil Winding and Coil Taping Machines enable even poor operators to do better work in quick time and at the least expense.

Columbia Armature Banding Machine

Columbia Machine Works

Atlantic Ave. and Chestnut

—The Quality Group



Economies in Railway Repairs

The Columbia Armature Banding Machine is a necessity; the Columbia Pinion Puller and Armature Buggy will save much wear and tear on delicate mechanism.

The Columbia Axle Straightener has done yeoman service in the shops of the Third Avenue Railway, New York City.

The Columbia Tension Stand for Winding Field and Armature Coils, speeds up winding work tremendously; Columbia Adjustable Armature Stands are needed in truing up Armature; Columbia Rools for Flattening Leads of Armature Coils permit the work to be fed toward the operator.

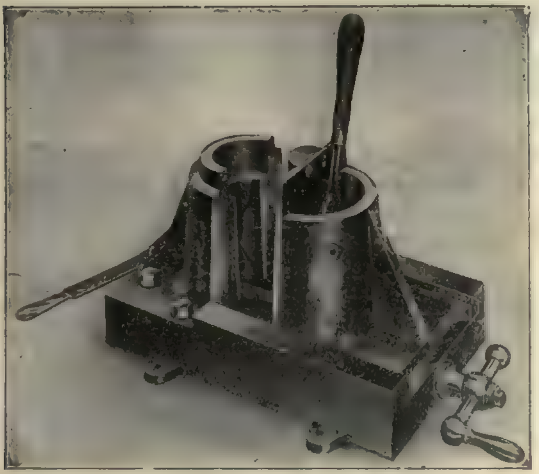
Columbia Pneumatic Pit Jacks and Columbia Electric Car Hoists are the finest jacks and hoists to be obtained for electric railway shops.

And so on down the long line of Columbia tools and specialties. Write for Bulletins.

& Malleable Iron Company

Street, Brooklyn, N. Y.

Columbia Adjustable Armature Stand



Columbia Electric Hoists

Columbia Electric Hoists are the shortest cut to repair shop economy because they are made according to a special design of great simplicity and efficiency.

They will elevate a 50-ton car 6 ft. in five minutes, without swaying. Any old traction motor will run them.

One demonstration will convince you

Columbia Machine Works & Malleable Iron Company

Atlantic Ave. and Chestnut St., Brooklyn, N. Y.

A. A. GREEN, Sales Mgr.,
50 Church St., N. Y. C.
E. ALLISON THORNWELL,
1026-7 Atlanta Trust Bldg.,
Atlanta, Ga.

J. L. WHITTAKER,
141 Milk St., Boston, Mass.
F. F. BODLER,
903 Monadnock Bldg.,
San Francisco, Calif.

W. McK. WHITE
6712 Cornell Ave., Chicago, Ill.
Ernest Keller
Frank Hedley
Brooklyn, N. Y.

J. G. Buehler, Pres. and Treas.
L. O. Smith, V. P. & Gen. Mgr.
Chas. Buehler, Secy.

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, riggings, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resistors
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels

TOOLS

- Armature and axle straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil tapping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

Safety First

not only from the accident prevention viewpoint but also from the financial standpoint is the basis upon which the Perley A. Thomas Car Works is manufacturing Birney one-man safety cars.

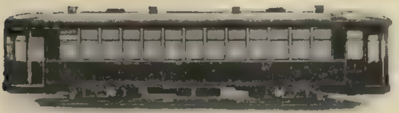
Because these safeties have actually solved one of the greatest problems the electric railway industry has ever faced; that of high operating costs.

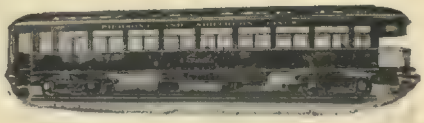
From the beginning, safeties from the Perley A. Thomas Car Works, have cut operating expenses, reduced accidents and have been a comfort to a formerly disgruntled public.

The Engineer and designers of these cars by their past experience are qualified to give the electric railway industry the best that is to be obtained in either a safety or a double-truck car. The builder of these cars drew up the first designs ever made of The Birney Tee Post Car for C. O. Birney. Let us figure on your requirements.

CARS OF ALL TYPES
From
BIRNEY ONE-MAN SAFETY
to
LARGE CITY AND INTERURBAN

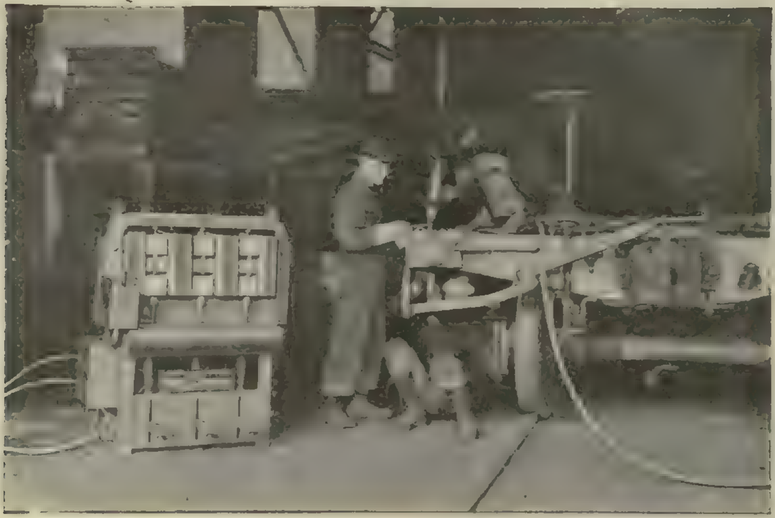
Whatever your car requirements, we can fill them to your entire satisfaction. Give us a trial.





PERLEY A. THOMAS CAR WORKS
HIGH POINT, N. C.

BERWICK ELECTRIC RIVET HEATER



The New Way of Heating Rivets

Note in above picture how close to the workmen the Berwick Heater is placed. Unlike a coke or fuel-oil furnace, the Berwick throws out no smoke or fumes. Much time is saved because the Heater can be placed conveniently close to the work.

In starting, too, the Berwick Electric Heater saves time and bother. You turn on the current and in less than half a minute have hot rivets ready for driving. Power is used only when hot rivets are needed—less than 20 kilowatt-hours per hundred pounds of rivets heated.

The Berwick Heater is absolutely safe. It heats the rivets uniformly, radiation being from center outward. Since all rivets are in plain view while being heated, spoilage by burning and scaling is practically eliminated. This feature alone in average shops saves 40 cents per hundred pounds of rivets heated.

We used Berwick Heaters in our own car shops for more than five years before any were offered for sale. All experimental work has been done.

More than five hundred Berwick Electric Rivet Heaters have been sold since January 1st. Investigate now and be among the first to profit by this new development.

Send for catalogue. Please mention sizes and quantity of rivets used and alternating current conditions.

American Car and Foundry Company

Chicago **165 Broadway, New York** **St. Louis**

Railway coach, dining and sleeping cars; express, baggage and mail cars; electric railway cars; freight cars, including box, flat, gondola, hopper, dumping and tank types and cabooses; special purpose cars for carrying cane, live stock, etc.; industrial, mine and logging cars; car parts, including trucks, coupler pins and links, and chilled cast iron wheels; electric rivet heaters; bar iron and steel; bolts, nuts and rivets; iron-body gate valves; flanged pipe.

HABIRSHAW
"Proven by the test of time"
Insulated Wire & Cable

Reliability and Research

Scientific Study

THE Habirshaw method of maintaining the reputation of its products for reliability and keeping informed as to new requirements and developments in the art of wire and cable engineering is by means of scientific study.

Habirshaw engineers not only keep abreast of the times but are constantly endeavoring to improve and widen the field of usefulness of insulated electric conductors. To accomplish this, Habirshaw maintains three research laboratories manned by the best of scientific talent and equipped with the most modern scientific apparatus.

The Habirshaw organization provides for complete co-operation between sales, technical and manufacturing departments so that the individual needs of customers may be adequately cared for from the first-felt want to the delivery of the desired material.

Habirshaw Wire Manufactured by
Habirshaw Electric Cable Co.
Incorporated
Yonkers, New York

Habirshaw Wire Distributed by
Western Electric Company
Incorporated

Offices in All Principal Cities

Paper Insulated Cable
Round Conductor Cables
Sector Cables

Varnished Cambric Insulated Cables
Armored Cables

Rubber Insulated Cables
Code (Black Core)
Intermediate (Red Core)
30% Hevea R. S. A. Standard

"BOYS, GET THE MONEY"

A poor slogan for political money-diggers, but in colloquial street railway talk everybody knows it means the tough operating job of gathering in all the fares. For instance, you boost fare units, buy new types of cars, add a zone to the interurban lines, etc. and then the executive responsible for the financial health of the property comes around and says, "Now boys, *get the money.*"

With this injunction ringing in their ears, hundreds of operating officials will attend the Atlantic City Convention this month looking for improved methods and mechanisms. Representatives of this company will be on hand to talk over all angles of this subject with you.

Fare collecting devices which efficiently serve up-to-date conceptions of the problem are very, very few in number. You may hesitate to discard the old method of picking up fares by hand, *but you have no argument to advance in its favor.* You realize that the A. E. R. A. Committee reporting last year on this problem of COLLECTION AND REGISTRATION OF FARES recommended that hand collection, with later optional registration by the conductor, *"should be eliminated."* The recommendation was that "mechanical registering devices, either stationary or portable," be used. If proper weight is attached to the report of these experts no operative need knit his brows or become confused in locating types of registers operating on the principle indorsed by the committee. The time has gone by for advancing arguments for or showing timidity in cutting loose from old methods.

The ROOKE is a "mechanical registering device" of the "portable" type and the only such small fare box on the market. The ROOKE is being used by important companies as standard on *all types of cars.* Other companies, already equipped with stationary boxes, use the ROOKE exactly as recommended by the Committee, for the collection of zone fares and to meet all contingencies when the passenger does not go by the box. This shows consistency, certainly, and *it means that you will "get the money."*

THE NEW ROOKE REGISTER IS A GREATLY IMPROVED MACHINE. It will receive and accurately register, on separate totalizing counters, NICKELS, DIMES, QUARTERS AND METAL TICKETS in any combination or *all* of these fare values received into the one coin slot of one register. The passenger actually *registers his own fare, instantaneously,* the bell rings and the conductor instantly receives the money.

—the PASSENGER has

The Initiative in Fare Registration

—he registers the exact fare value he pays—instantaneous registration, with bell.

The capacity of the Rooke Register is not limited to a single denomination coin. It will take nickels, dimes, quarters or metal tickets representing a 2½, 6, 7, 7½, 8 or 9-cent fare, and classify them on different counters.

Rooke Automatic Register

"NEW CAPACITY" ROOKE

THE HUMAN ELEMENT

A panacea for eliminating the "human element" in a good many lines of endeavor has been just about as futile as the quest for perpetual motion. However, when it comes to fare registering devices just the opposite course is best.

No fare box ever made will get all the fares unless the human element is there. It is the human element in the personal services of the conductor that is vital.

With the ROOKE register, the conductor must of necessity "single out" each of his fares and must personally co-operate with the passenger when the fare is paid. This means no loss in speed. It does mean the presence of the all-important get-to-gether factor and relationship between passenger and conductor at psychological moment. It is profitable for the company to have the attention of the conductor focused on the job of collecting each fare. If the conductor becomes only a doorman and feels no responsibility, the "mechanical registering device" recommendation loses a great deal of its value in actual practice.

Again, with the ROOKE register the passenger actually registers his own fare and can feel and hear the mechanical functioning of the mechanism determining instantaneous registration. This only is instantaneous registration, the acme of successful mechanical fare collection.

If you stop to consider, there are only sixty-six railways in this country still operating on a five cent fare and these are dwindling rapidly. With the railways putting up to the commissions the correct figures to prove that they are entitled to a fare sufficient to cover operating expenses and to attract new capital, it is imperative to install a fare collection system that insures as near as possible the collection of 100% of the fares.

This the new ROOKE register is guaranteed to do. The new register differs but little in appearance from our old models. It is however, a greatly improved mechanism. All different coins are paid into the *one coin slot.* and registration is *positively automatic* and *instantaneous.* These registers are *unbeatable.*

The ROOKE register may be *installed without friction* or embarrassment and without involving expenditures to re-arrange your cars to receive the system. It brings to you the best possible METHOD of collection, with great auditing economies and maintenance savings. The MECHANISM enables you to successfully *standardize fare collection on all your equipment.*

—The CONDUCTOR has *collection-control* only when he has

The Initiative in Fare Collection

—he "goes after," sees, and is responsible for the exact value collected.

Co., Providence, R. I.

"NEW CAPACITY" ROOKE

What do you demand of a Stoker ?

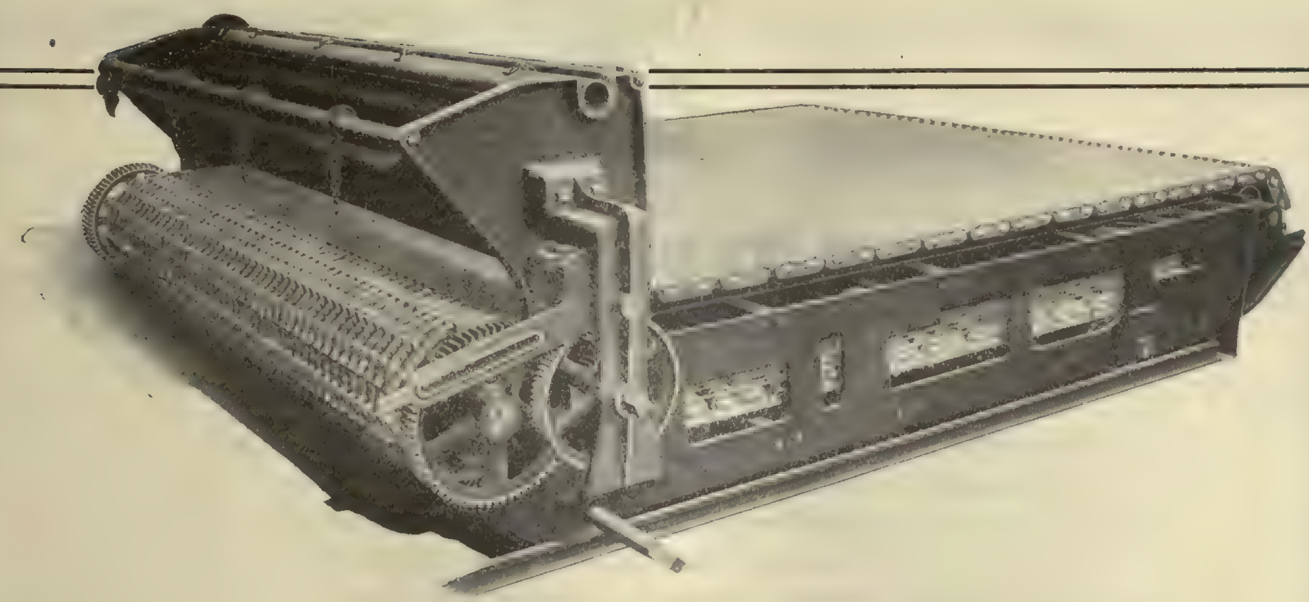
–that it

Reduce labor costs?
" Fuel " ?
Burn high ash coals?
" --moisture " ?
Eliminate Smoke?
" Clinkers?
Maintain heavy overloads?
Guarantee high *net* efficiency?

Backed by 23 Years of Specialized Experience

Green Sealflex Arch
Green Pressure Waterbacks
Green Steam Jet Ash Conveyors
Green Cast Iron Ash Tanks

GREEN



. . . . . Green Chain Grates

Green Chain Grates reduce labor costs by practically eliminating the human element. The fuel is fed and burned, the ash discharged and the grate surfaces cleaned without any human assistance.

They reduce fuel costs by insuring combustion so complete that every available heat unit is extracted from the coal.

By means of that inherent chain grate advantage, Progressive Combustion, the lowest grades of coal in every local market can be burned without smoke or clinker.

Clinker free operation eliminates shutdowns for cleaning. There are no non-production periods in the Green equipped plant. Heavy overloads are easily reached and maintained.

Efficiency in the Green sense, is *net* efficiency. The driving engine requires but 30 lbs. of steam per hour for the largest size stoker, less than 1% of the power generated. There are no other steam consuming auxiliaries.

Write for the Green Book!

The Green Book "Progressive Combustion" contains complete descriptive and pictorial information on coals and their proper firing and upon Green Chain Grate Stokers. Write for a copy today to Dept. C.

GREEN ENGINEERING COMPANY
100 Kennedy Avenue, East Chicago, Indiana

CHAIN GRATES

"K" Type for Clinkering Coals

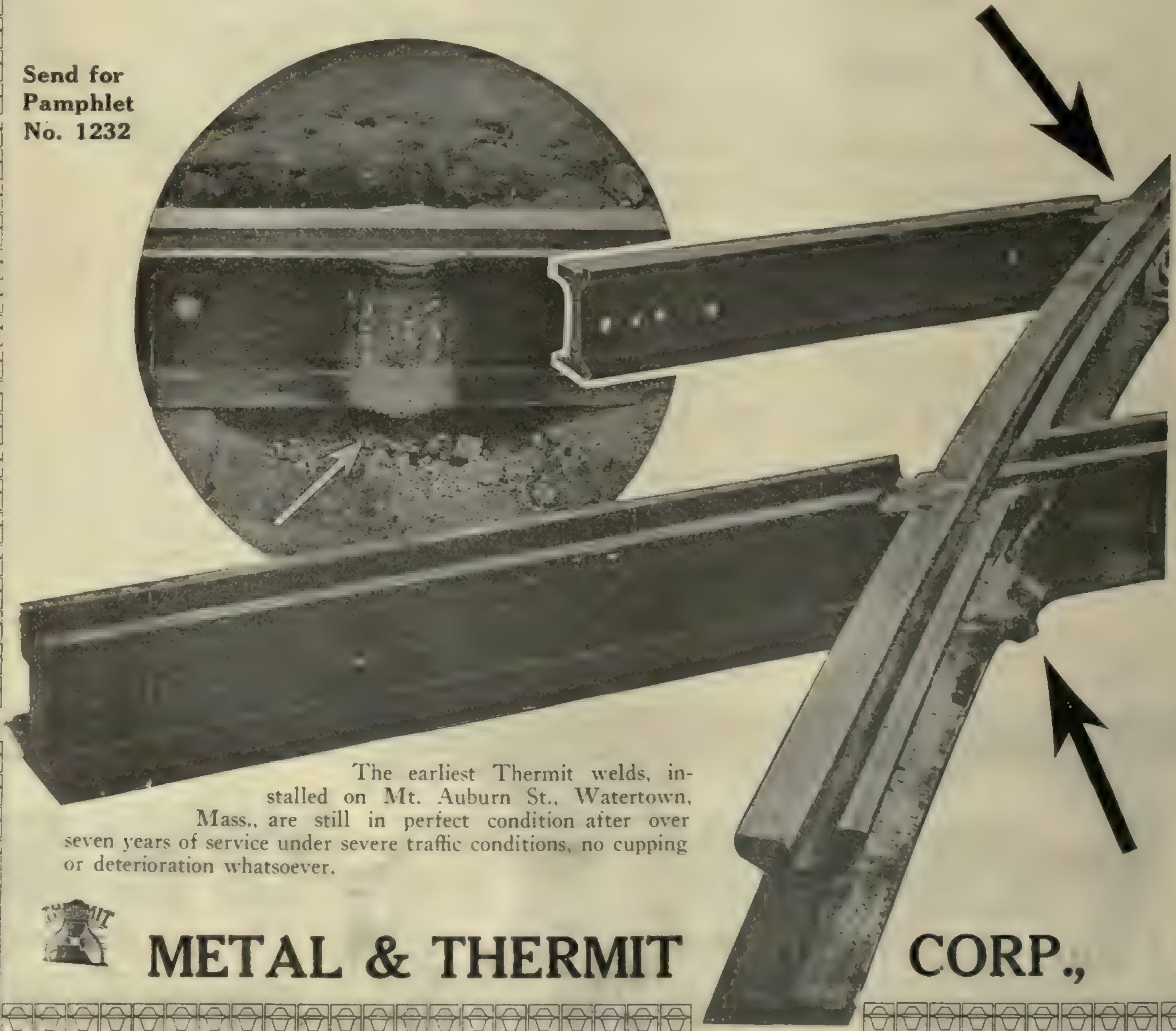
"L" Type for Coking Coals

THERMIT

INSERT RAIL WELDING

This continuous and permanent form of track construction is widely replacing the short-lived joint of the bolt and the "jolt," as well as the electric welded joints, the majority of which merely consist of welding plates or bars to the rail, without eliminating the break between the rail ends.

Send for Pamphlet No. 1232



The earliest Thermit welds, installed on Mt. Auburn St., Watertown, Mass., are still in perfect condition after over seven years of service under severe traffic conditions, no cupping or deterioration whatsoever.

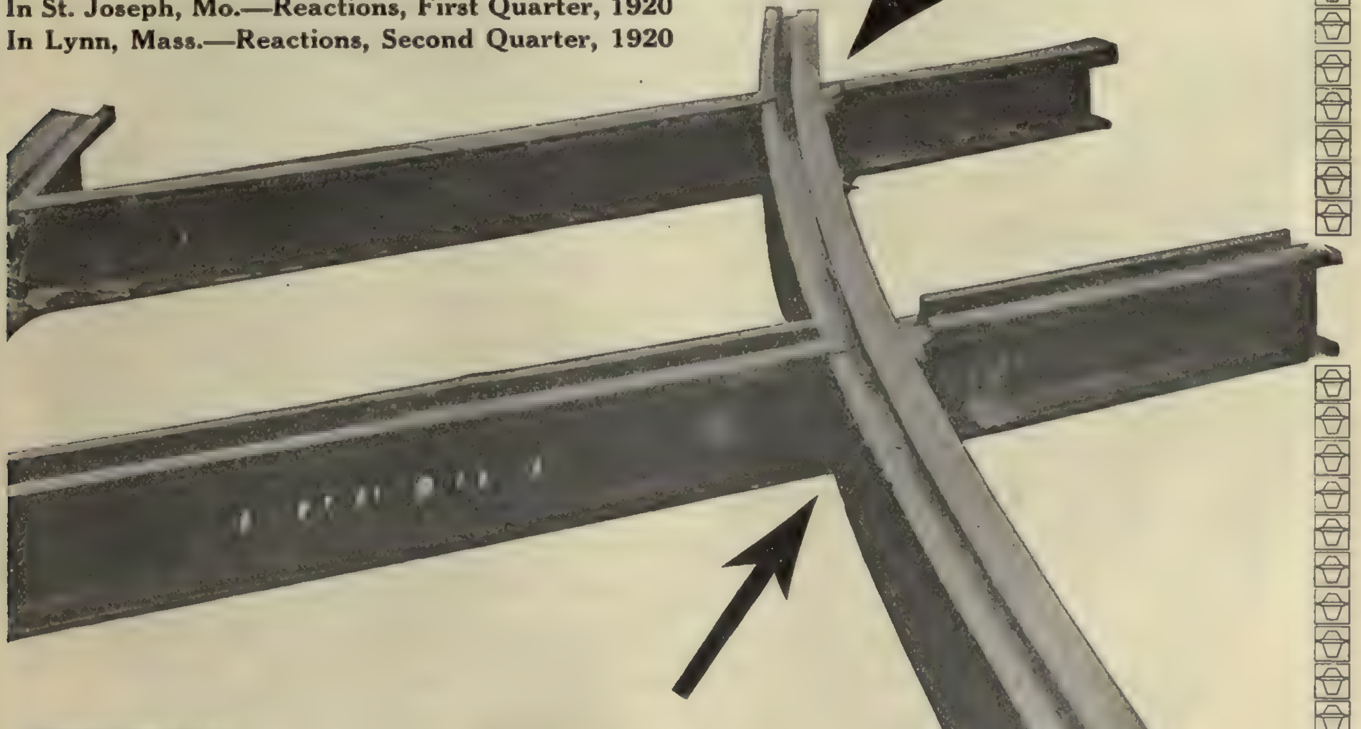
METAL & THERMIT CORP.,

THERMIT
TRADE MARK REG. U.S. PAT. OFF. GOLDSCHMIDT PATENTS

WELDED SPECIAL WORK

Don't fail to send for REACTIONS, the Thermit Quarterly, and read of the successful results of Thermit Welded Frogs and Special Work in *replacing* and *outlasting manganese special work,* yet *costing only a fractional part* of the latter.

In Indianapolis—Reactions, First Quarter, 1919
In Milwaukee—Reactions, Third Quarter, 1919
In St. Joseph, Mo.—Reactions, First Quarter, 1920
In Lynn, Mass.—Reactions, Second Quarter, 1920



Read in future issues of REACTIONS how this economical and lasting form of track construction is spreading all over the U. S.

General Offices, 120 Broadway, New York

THERMIT

THERMIT

Your Biggest Invest

Isn't it worth while making that investment as permanent as possible? Of course, it is. Then why not give the subject the thought that it deserves? We know that the more carefully you consider the subject the more you will be convinced that the one big factor operating to cut the life of your track is the item of RAIL JOINTS. Eliminate them; you can do it. Let us show you how. Let us tell you how. Pittsburgh is doing it right now at the rate of between 300 and 400 every week. Let us show you how successfully other cities such as Youngstown, Milwaukee, San Antonio, St. Joseph and many others have done it in the past.

Don't be satisfied with mechanical joints or with plates or bars welded to the rails simply because the first cost appears to be cheap. *It is the last cost that counts.* None of these methods get to the root of the trouble. The real solution is to abolish the joints entirely, make your rails absolutely continuous "the Thermit Way," and obtain the FULL LIFE of your track

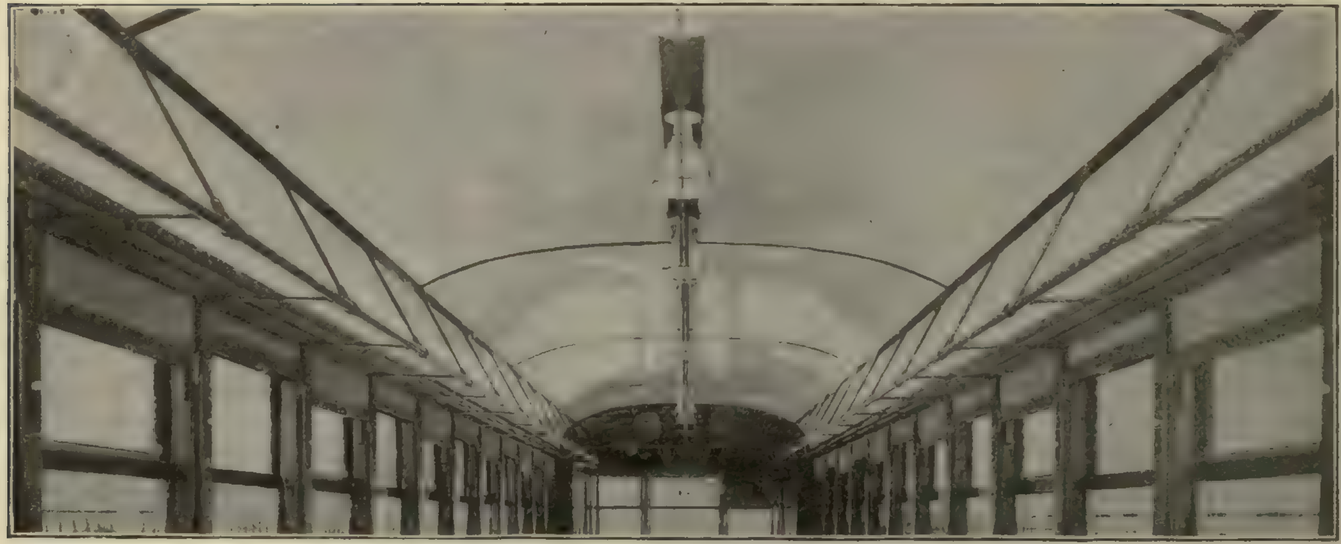
Our engineers are at your service to advise regarding methods and practice and give complete cost information.

Metal & Thermit Corporation,

ment is in Your TRACK

"The Thermit Way"

General Offices: 120 Broadway, New York



NEVASPLIT HEADLININGS

do more than never split

They never shrink, warp nor check.

They are waterproof and of minimum conductivity.

They make car interiors safer and more beautiful.

The smooth, even surface takes paint most readily, with pleasing results.

They mean lighter cars—lighter in weight and appearance and "illumination."

NO WONDER so many big roads use them—for instance, the 100 new cars of the Philadelphia Traction Company.

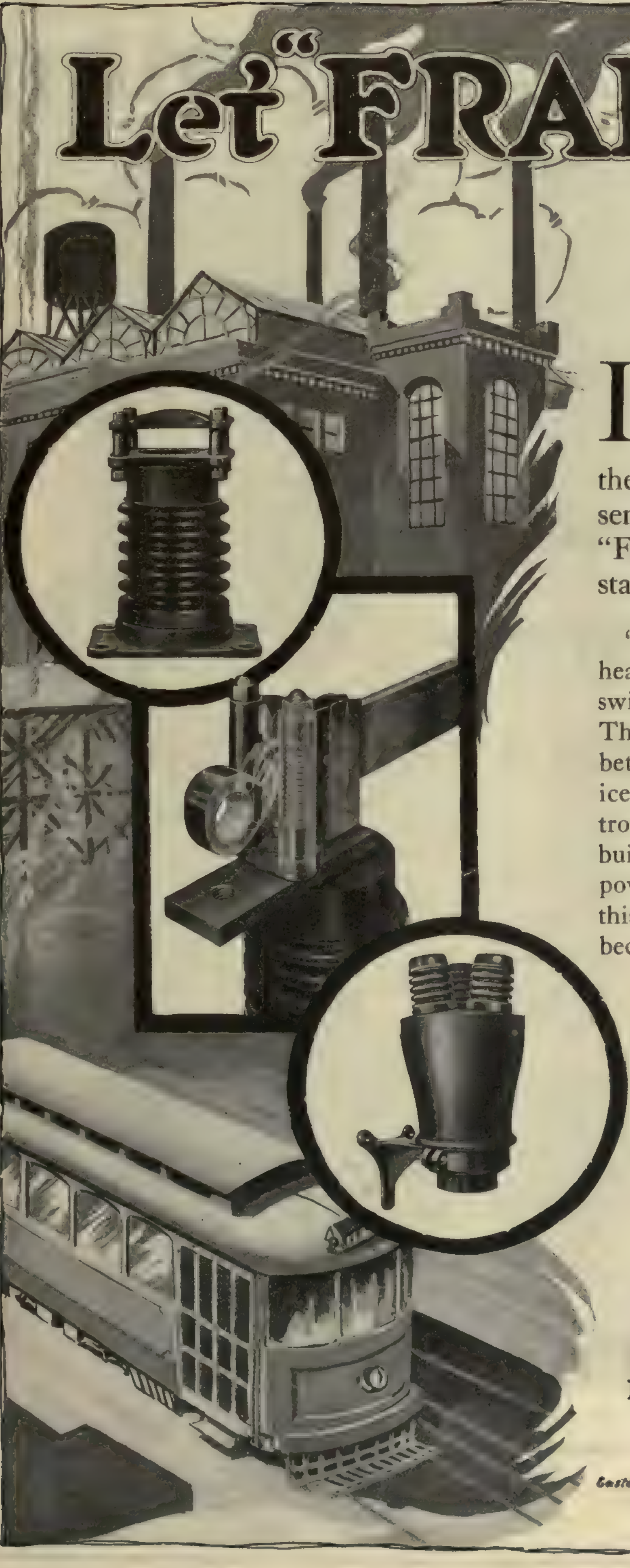
Write for Booklet and samples.

The Keyes Products Company

120 Broadway, New York

Columbia Machine & Malleable Iron Co., 30 Church St., New York.
National Safety Car & Equipment Co., St. Louis, Mo.
SAN FRANCISCO: Ford & Geirrine, Merchants Exchange Building.

Let "FRANKLIN" Help—



IN all extensions and improvements and replacements to your power stations, apply the "Safety First" idea in a sensible, practical way. Install "FRANKLIN" *safer* generating station equipment.

"FRANKLIN" insulators, potheads, disconnecting switches, relay switches and other devices are all safer. They were designed to give not only a better and a simpler, but a safer service — to save risk and accidents, and trouble and time. Each one has been built to meet the needs of some great power plant. We have standardized this made-to-order equipment and it becomes available to you.

In each "FRANKLIN" device cost has been a secondary consideration. It has been planned and built for quality, for economy, for unfailing reliability in service—"You can install the 'FRANKLIN' and forget it"—You know that it is sure and safe.

Write for our bulletins today.

ELECTRICAL DEVELOPMENT
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Inspect Equipment

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ECONOMY ELECTRIC RAILWAY METER
SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS
NO. 1036948 VOLTS 550 AMPS 100
3 31/3 WATTHOURS PER DISK REVOLUTION
MFD. EXCLUSIVELY FOR
ECONOMY ELECTRIC DEVICES CO.
CHICAGO

on the Kw. Hr. Basis

The Economy Power-Saving Railway Meter Provides the Safest and Most Efficient Basis for Equipment Inspection

Most parts of a car require inspection at intervals proportionate to work done. Neither mileage run, elapsed time, power-on time or any other time factor correctly measures the work done by the car.

The ECONOMY "Power-saving" and Car Inspection Meter provides a method that accurately and automaticaly shows when inspection is needed. It also shows at a glance how much more work a car can do before inspection is needed, or, in case of a road failure, how much work it has done previous to the failure. All this is had without any clerical labor.

The result is more thorough inspection without increased labor cost, or the previous standard of inspection for less labor cost. It will save considerable money heretofore spent because of too many inspections on some cars and too few on others.

The opposite page shows an ECONOMY Power-Saving Railway Meter, with car inspection dials. The cyclometer type dials at the top are for motormen's power saving records. The lower dials are for car inspection use. The meter is unchanged from standard except for the front case and dial, which are applicable to old meters.

When the meter-driven hand on dial A reaches the marker set for this car at 6, the barnman knows that the brakes and controllers have done their work and are due for inspection equivalent to that otherwise made daily.

Likewise dial B shows when the car has done sufficient work to require oiling. This supplants the usual time or mileage period for oiling.

Dial C shows when the car has done sufficient work to require general inspection.

After any inspection the meter-driven hand is set back to zero by means of its reset rod at the bottom of the case.

A lock prevents unauthorized resetting of inspection dials.

The ECONOMY Meter with inspection dials is readily adaptable to any electric car or locomotive operating condition. It is the only power-saving device whose unit is correct for use in determining when cars should be inspected.

The ECONOMY Railway Meter saves power at the car and labor at the car house.

Ask for Deferred Payment Plan and estimate of operating costs.

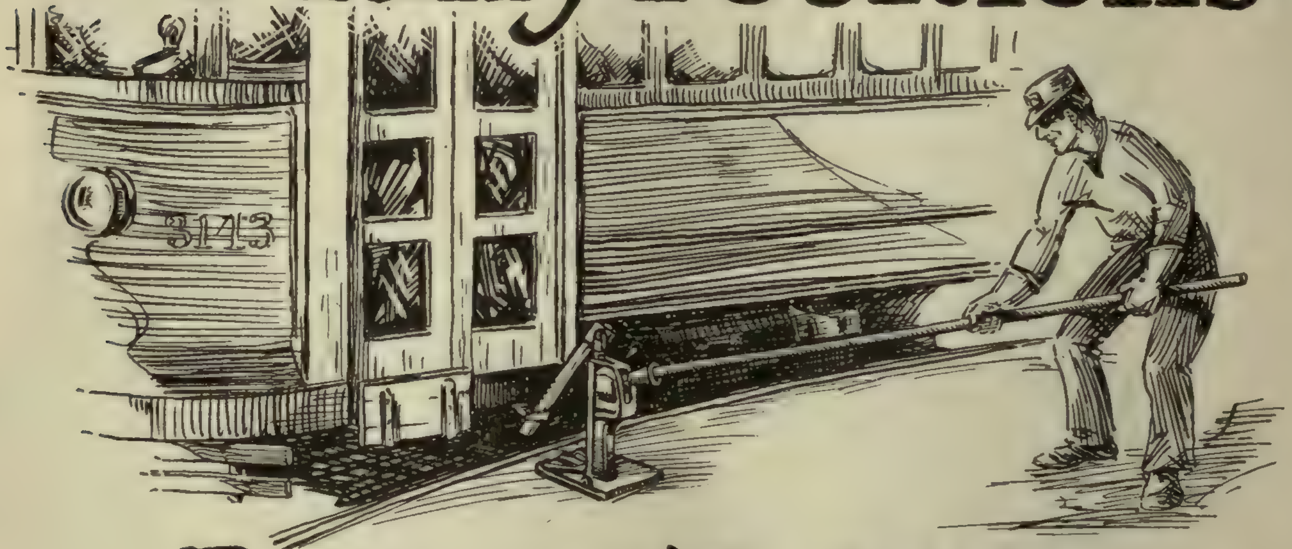
See Pages 32, 33

ECONOMY ELECTRIC DEVICES COMPANY

Old Colony Bldg., Chicago, L. E. Gould, Pres.

National Railway Appliance Co., New York
Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis
Burton R. Stare Co., Seattle
J. G. Monahan, Los Angeles
L. A. Nott, San Francisco

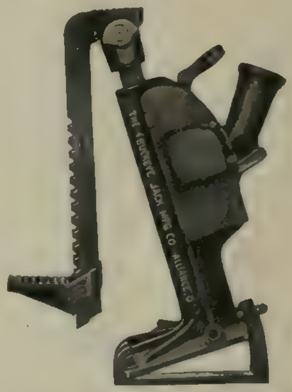
Full Power in Many Positions-



Buckeye No. 239 Special Emergency Jack

Suitable for Every Railway Purpose

One of the main problems of Jack Service is to get the jack to bear on the load, regardless of circumstances. This is just the service rendered by this Buckeye. It is quickly adjustable to many positions—gets you out of many a difficult situation. It has *full power* with high or low adjustment—saves time, strength and trouble. Altogether, a fine all-round piece of equipment. Full details in catalog. Write for it.



50 other types and sizes for railway use

The Buckeye Jack Mfg. Co.

Alliance, Ohio

"COPPERWELD"

TRADE MARK REG. U. S. PAT. OFF.

"Copperweld" is a copper conductor with the strength of steel.

Its 60% greater tensile strength prevents the wire from sagging and causing excessive wear at ears and hangers.

A short circuit will not anneal "Copperweld," as it does hard drawn copper wire; in fact annealed "Copperweld" has a tensile strength equal to hard drawn copper wire.

"Copperweld" Wire weighs from 7% to 10% less than copper (size for size). This reduces the weight of the overhead construction and results in a saving in original investment.

"Copperweld" also costs less per pound, which accomplishes a further saving.

"Copperweld" outwears solid copper wire four to one—due in part to less flexture or bending near the supports, and also to the wearing qualities of the steel and copper surface which is presented when the copper becomes worn through on the underside.

If *you* are interested in the manufacture, characteristics, and use of "Copperweld," Wire, write for a copy of Catalogue No. 22.

COPPER CLAD STEEL COMPANY

ARISTOS COPPERWELD

OFFICE AND WORKS: RANKIN, PA. BRADDOCK P.O.
NEW YORK CITY OFFICE: 30 CHURCH ST.

WESTERN SALES REPRESENTATIVES:
STEEL SALES CORPORATION, CHICAGO, ILL.

Next Winter

'Tis true that there is a Locke Insulator for any kind of transmission line in any atmosphere from the rarified air of the mountains to the humidity of the seaside.

But, the one way of being sure that you will always have the right Locke Insulator when you need it is to order them *now*, so that delivery can be made in time to meet your needs.

Locke Insulators are worth that trouble!

Victors are standardized insulators but will also build to your specifications.

The Locke Insulator Manufacturing Co.
Victor, New York

Thomas

It Takes an Expert to Intelligently Recommend Insulators

JUST as it requires the careful study and thought of an experienced engineer to economically construct your systems, so does it require the services of one who has a thorough working knowledge of insulators to make intelligent recommendations.

HERE is one safe and sure way however, to operate your lines at 100% efficiency. Good sound reasoning alone does not make it sure and safe, but a "clean slate" of past performance is absolute proof of what a **THOMAS INSULATOR SPECIALIST** can do for you. Let him go over the next "Insulator Proposition" with you. You will be under no obligation, of course. It will only reveal to you the true reason for the explicit faith that some of the largest Central Stations in the country hold for this service.

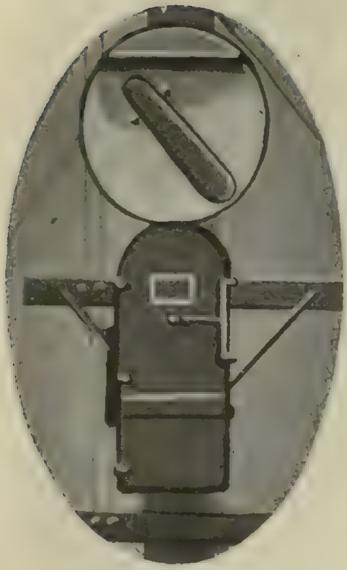
THOMAS PRODUCTS PAY BACK BIG DIVIDENDS IN SERVICE

PINS INSULATORS SUPPORTS CROSS-ARMS

Write for this new booklet today—PINS and CROSS-ARMS, also for a copy of THE WAYS AND MEANS OF BETTER INSULATOR PRACTISE

THE R. THOMAS & SONS CO.

NEW YORK BOSTON **EAST LIVERPOOL, OHIO** CHICAGO LONDON
Northern Electric Co., Ltd., Canada Western Electric Co., Inc., Pacific Coast



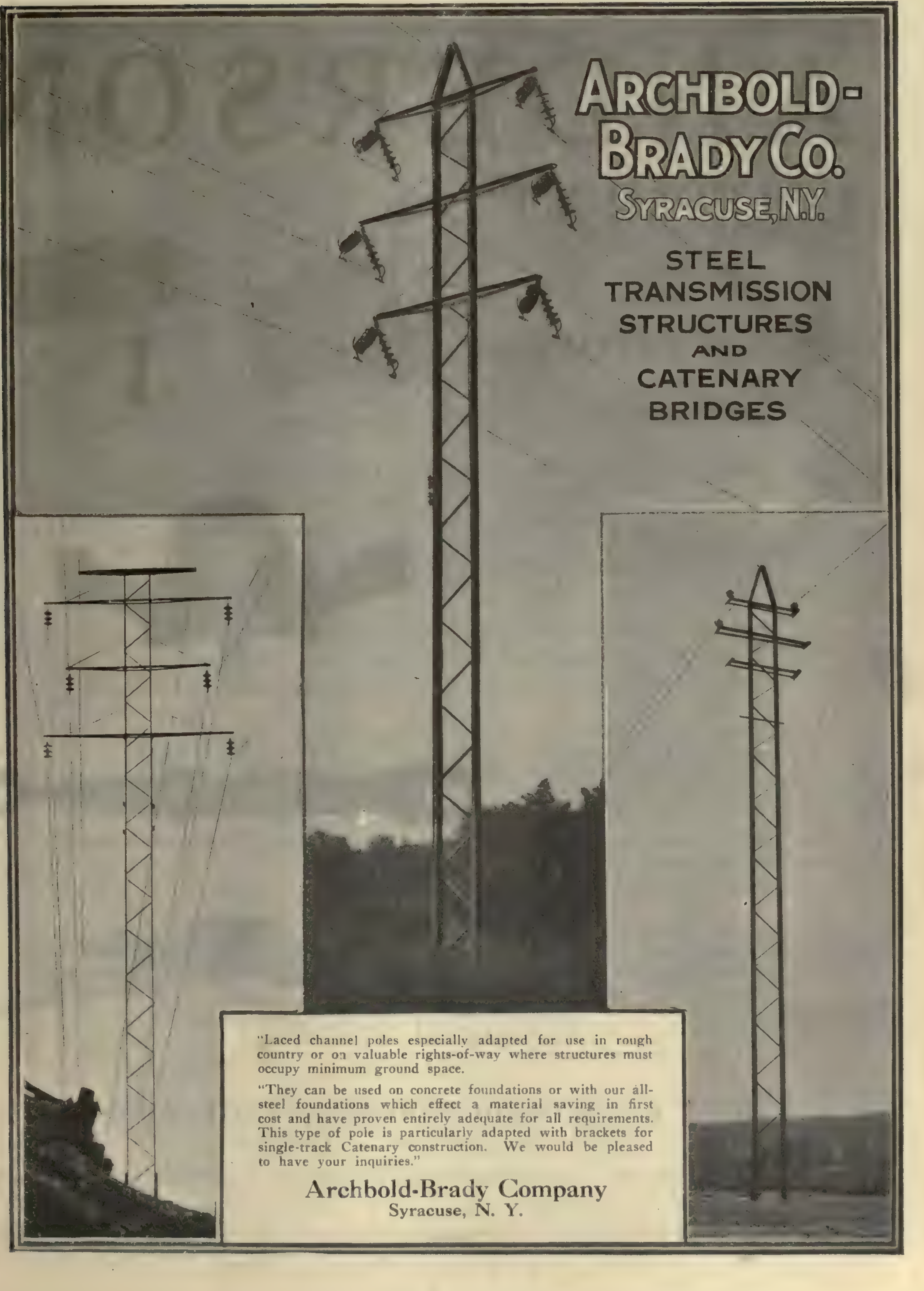
CHAPMAN

Signal for High Speed Service

High Speed Service needing protection, but not able to afford track circuit signals, Chapman Automatic signals operated by Chapman Track Relays will give the required protection at a cost that you can afford.

15 blocks have been in continuous service on the Jamestown, Westfield & Northwestern Railway between Westfield and Chautauqua, N. Y., for 3 years.

Charles N. Wood Company
14 Federal Street, Boston, Mass.



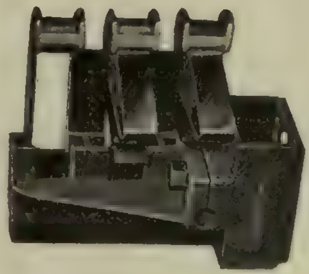
"Laced channel poles especially adapted for use in rough country or on valuable rights-of-way where structures must occupy minimum ground space.

"They can be used on concrete foundations or with our all-steel foundations which effect a material saving in first cost and have proven entirely adequate for all requirements. This type of pole is particularly adapted with brackets for single-track Catenary construction. We would be pleased to have your inquiries."

Archbold-Brady Company
Syracuse, N. Y.

ANDERSON

EQUIPMENT
Insures
Satisfactory Service


Lindall Brush Holder

Canopy Switch

Each Anderson Specialty was especially designed for a particular condition or service and each is the result of actual knowledge of real working conditions—not just theory.

For years the name Anderson has built up prestige for itself in this particular field and it is your guarantee of satisfaction. Experienced maintenance of way men KNOW the Anderson Line—and the REPORT is invariably one of good service.

The illustrations herewith show but a few of the many Anderson Specialties, which include

Aetna Insulation
Trolley Bases, Harps and Wheels
Section Switches
Quick Break Switches
etc. etc.

Write today for Copy of Catalog 8

Round Top Straight Line Suspension

Double Take Up Wood Strain Insulator

Anderson Crossovers

ALBERT & J. M. ANDERSON MANUFACTURING CO.

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Railway Engineers Who Have Studied the Qualities of Lumber

are a unit in agreement on the fact that

CYPRESS—*"the Wood Eternal"*

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TRADE MARK REG. U.S. PAT. OFFICE

(provided that you get Genuine "Tide-water" Cypress, guaranteed by the Association's Trade-mark)

is the best wood for all forms of use where high resistance to decay is an essential.

This fact is pretty clearly indicated by the recommendations of the Railway Signal Engineers Association for the use of Cypress in

TRUNKING and CAPPING

it is equally valuable for *right-of-way fencing, snow fences,* and all similar forms of use where the material is constantly exposed to the action of the weather.

Make such forms of construction supremely durable by using

CYPRESS

"The Wood Eternal"

Full data regarding Cypress for all electric railway uses will be furnished on request.

Southern Cypress Manufacturers' Association

1265 Hibernia Bank Building
New Orleans, La.

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Eureka

Controller Fingers

are made of hard drawn or drop forged copper while the springs are stamped from special alloyed rolled phosphor bronze sheet. Fingers are interchangeable with all standard controllers.

Trolley Ears

are cast in one solid piece with grooves milled centrally, making soldering unnecessary. The alloy used in making ears is tough, durable and free from scrap.

Sleet Wheels

They are closely inspected, carefully finished and well balanced. They will give a maximum mileage with a minimum of wear and tear on the trolley wire. Order them now and be prepared for winter.

Trolley Wheels

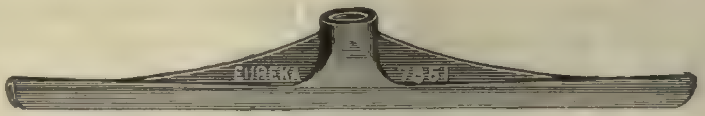
are perfectly balanced, made of virgin metal and well finished. Correct design insures less wear on trolley wire and longer life of wheel.

Commutators

are insulated with Canadian amber mica, the best obtainable. They are made for and stand up under heavy service. Standard parts are carried in stock.

Forgings

We make forgings of copper or bronze and castings in all sizes. Special sizes and shapes made to order. Eureka quality, the best workmanship from the best materials, enters into every delivered product.



COMMUTATORS, TROLLEY WHEELS, TROLLEY EARS, BRUSH HOLDERS
SLEET TROLLEY WHEELS, LINE MATERIAL, CONTROLLER FINGERS, BEARINGS.

Manufactured by

THE EUREKA COMPANY
NORTH EAST, PENNSYLVANIA

FORD
TRIBLOC

SAFETY, built in, is a feature of the Ford Tribloc. A patented Loop Hand Chain Guide permits operation at high speed from any angle, and prevents the hand chain gagging or over-riding the flange.

Steel cut gears, in planetary drive, are set in a dust-proof housing. Drop forged steel hooks and high-test steel chain only are used. And 3½ to 1 is the factor of safety throughout.

The men know it, they feel it, they work with confidence because of it. Everybody's satisfied.

CAPACITIES? Half a ton to twenty—and more.
CATALOG? Interesting—we'll send you a copy if you say so.

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ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
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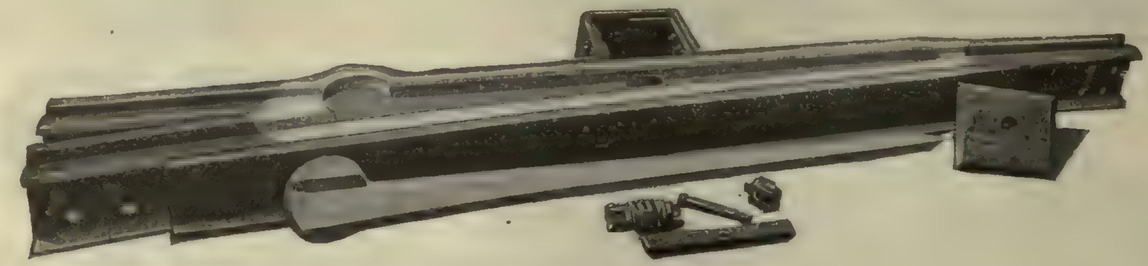


Longer Service Means Lower Maintenance

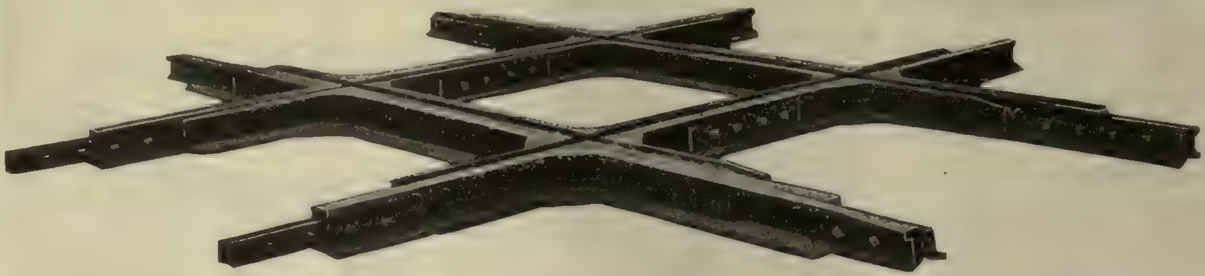
Ask any trackman what he thinks of this Switch and let us figure on your requirements in—

Switches, Mates, Frogs, Crossings and Complete Layouts

Avoid accidents by installing our

Improved Anti-Straddle Tongue Switch

This is the only Pinless Tongue in the market. Perfect Fit—Heavily reinforced with 100% Bearing Efficiency. Tongue is securely locked in either position and car cannot straddle the Tongue. No complicated mechanism. No trouble to maintain.



Crossings of every description for Steam and Street Railways.

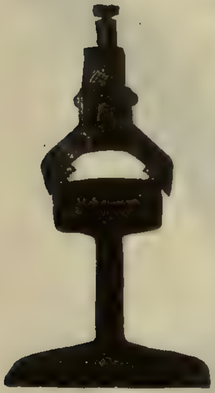
Solid Manganese—Balkwill Type—Insert and Built Up.

In our standard Iron Bound Frog and Crossing Construction we furnish High Carbon Hammered Steel or Manganese Centers at your option. The Centers are securely set on Machined Bearings —and are put there to stay.

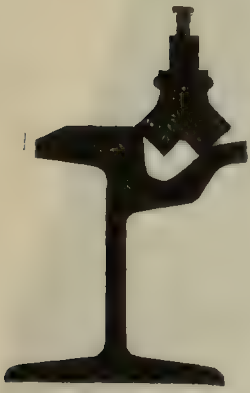
NEW YORK SWITCH AND CROSSING CO.

Office and Works, Hoboken, N. J.

Resistance 2½ feet or 30 feet of unbroken Rail?



Bar in place on "T" Rail showing Saw Blade Contact



Bar in place on "Girder" Rail showing Saw Blade Contact

You can find out —exactly!

Roller-Smith Bond Testers will tell you— *accurately*—just what the bond resistance is, from the "perfect condition" where resistance equals 2.50 feet of unbroken rail to that point where it equals 30 feet (or more) of unbroken rail.

The Roller-Smith "One Man" Bond Tester is the instrument to use in testing your bonds. It is small, compact, light, portable, direct reading, accurate, rugged and—above all—dependable.

Let us send you Bulletin No. G-200.

Bulletin G-201 shows a complete Portable Storage Battery Outfit for use when the current in the rail is small, intermittent or entirely absent, and an external source of current is required.

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Electrical Instruments Meters and Circuit Breakers

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ROLLER SMITH

BOND TESTERS ARE STANDARD OF THE WORLD

Yours
SPRING FROGS
SPLIT SWITCHES
ST. LOUIS FROG & SWITCH CO.
ST. LOUIS, MO.
CROSSING FROGS

280 Pages of Data on Track Work

No matter how broad your experience has been in the handling of track construction and maintenance problems, you will find this little book indispensable. Packed into its 280 pages are data and tables, mostly original, with some taken from standard works, covering, at a glance, wide range of requirements. Instructions are also given for the correct ordering of frogs, crossings, switches, turnouts, etc. There are over 200 designs, diagrams and illustrations. Size 5 x 7 inches, substantially cloth bound. We'll be glad to send you a copy absolutely free and postpaid. Fill in and mail the coupon—NOW.

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Gentlemen: Please send postpaid a copy of your Catalog and Railway Handbook.

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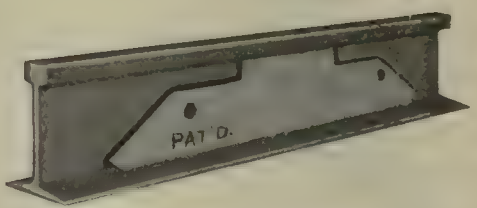
The "Indianapolis" Way

? WHEREIN IS YOUR ROAD DIFFERENT THAT "INDIANAPOLIS"

Indianapolis Joints That Rejuvenate Old Rails

The "Apex" Joint for Guard and Girder Rails



"Apex" Joint for Tee Rail

And the finished job conducts better than any new unbroken rail

With the climbing cost of maintenance and power, you've got to fight to a finish the imperfect rail joint with its appetite for trouble.

The remedy, as proved on thousands of miles of track, is the Indianapolis Welded Joint with its supernormal conductivity and its extension of track life. It overrides supposedly incurable cases—"bum" joints, battered splice bars, loose and broken off bonds. The cost is trifling compared to the alternative of putting in new rails at present prices.

You will have to meet your rail joint problem through the weld. The practice of other roads in selecting Indianapolis Joints is your surest guide.

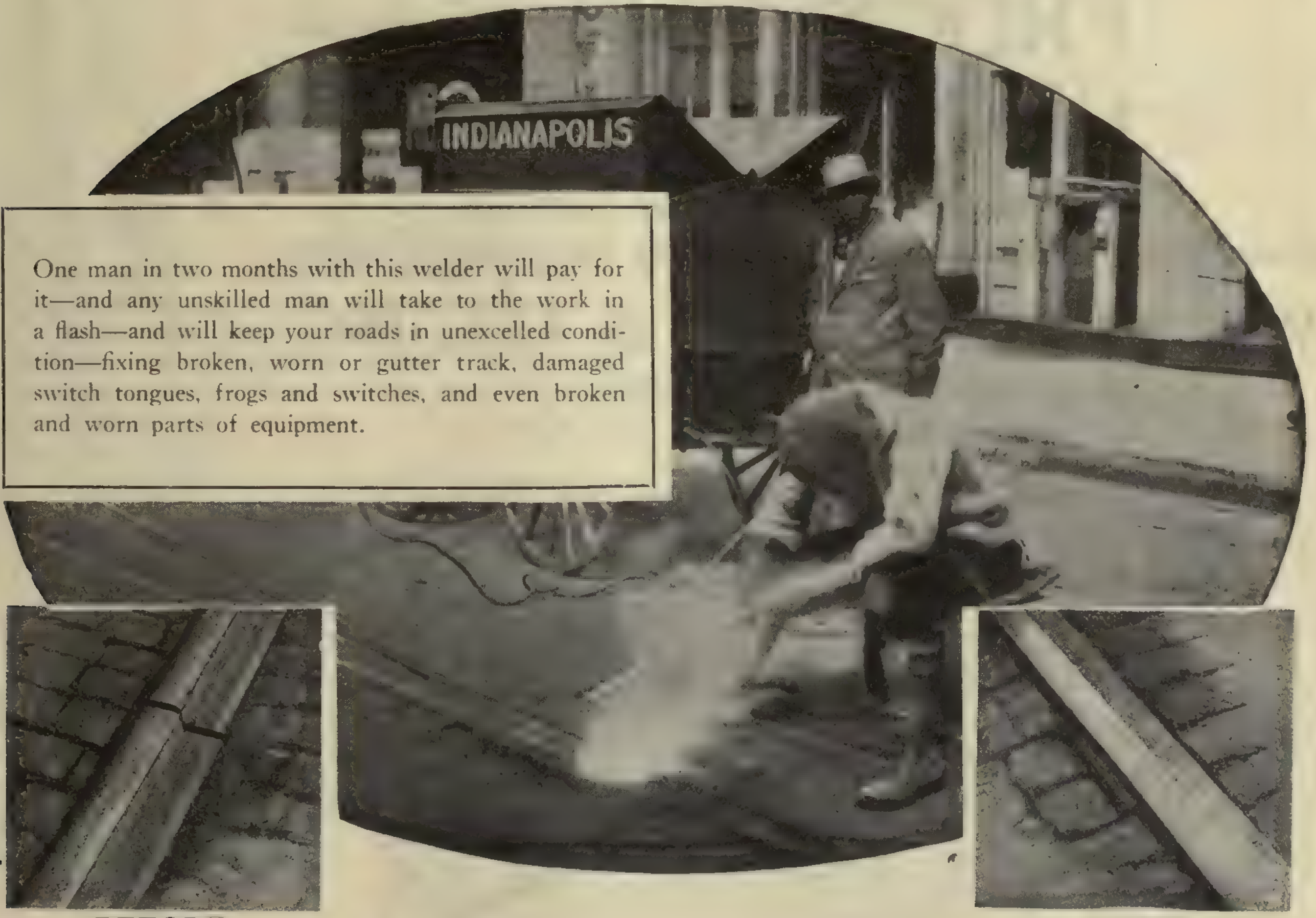
Bring your problems to our engineers and welding experts at Spaces 125-127 Machinery Hall, Atlantic City, Oct. 11-15

INDIANAPOLIS SWITCH &

Is the Cheaper Way

FROM THE HUNDREDS OF OTHER ROADS USE METHODS ?

The Indianapolis Welder That Has Saved Millions In Rebuilding Tracks



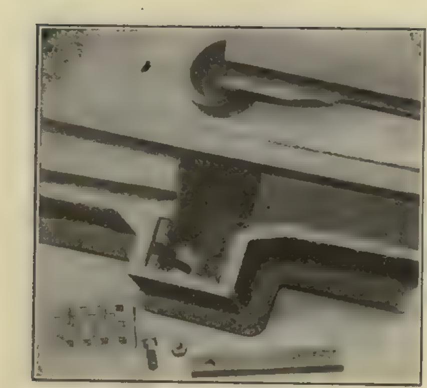
One man in two months with this welder will pay for it—and any unskilled man will take to the work in a flash—and will keep your roads in unexcelled condition—fixing broken, worn or gutter track, damaged switch tongues, frogs and switches, and even broken and worn parts of equipment.

BEFORE **AFTER**

It comes to you complete, ready to operate, and includes trolley connections, welding cables, handles, electrode holders and helmets—and is good for at least 20 years service.

Maintenance less than $1 a month. WHAT'S YOUR ANSWER?

FROG CO., Springfield, Ohio



R. C. B. Switch

WHARTON SPEC

SWITCHES
MATES
FROGS
CROSSINGS

*Solid
Manganese
Steel
and
Manganese
Steel
Insert*

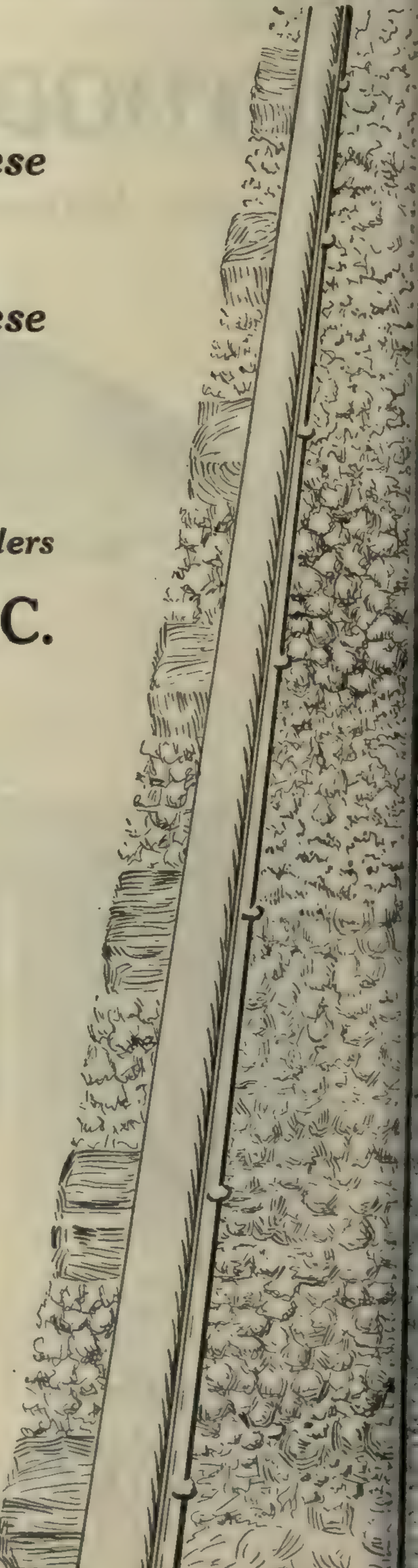
Converter and Electric Steel Castings
Hammer and Press Forgings Seamless Steel Gas Cylinders

WM. WHARTON, JR. & CO., INC.
EASTON, PENNA.

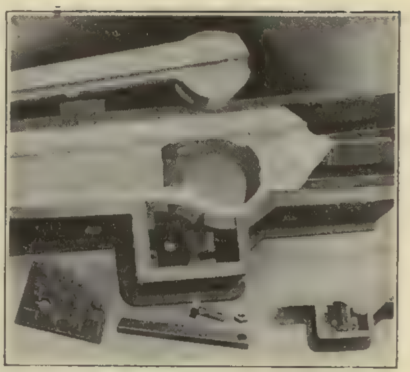
"Originators of Manganese Steel Track Work"

SALES OFFICES:

Boston, Mass.
Chicago, Ill.
Denver, Colo.
New York City
Philadelphia, Pa.
Pittsburgh, Pa.
San Francisco, Cal.
Scranton, Pa.



AL TRACK WORK



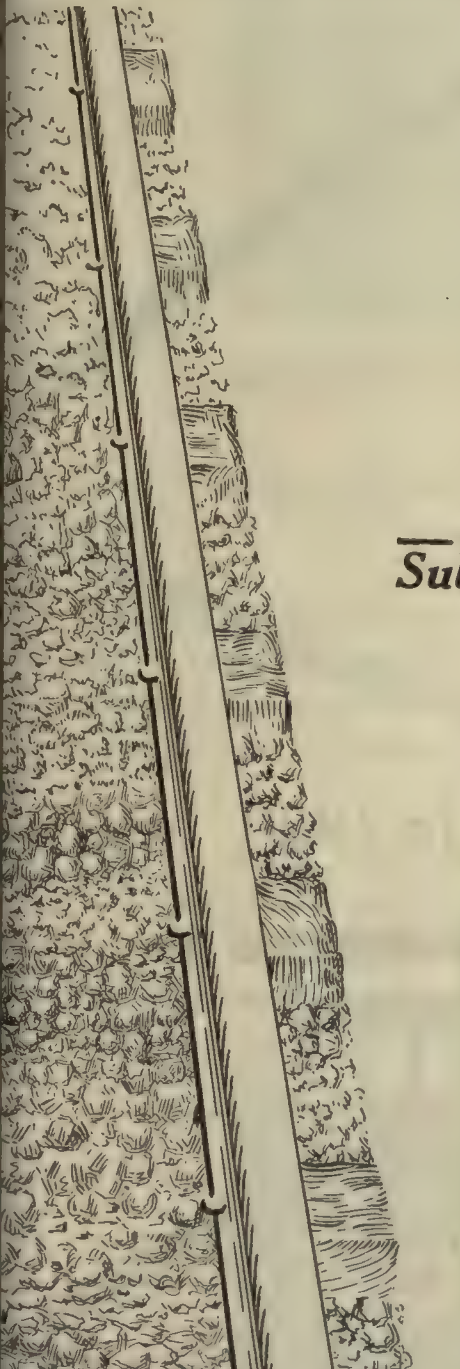
"GIANT HEEL" Switch

The illustration below gives a comprehensive view of our large Layout Yard, where Special Track Work is assembled and carefully fitted together, to avoid any possibility of trouble during installation. No piece of work leaves our plant without such careful fitting.

Our extensive, modern plant, illustrated on the preceding page, is equipped to fabricate track work of all constructions, Solid Manganese Steel, Manganese Steel Insert, Plain Bolted and Manganese Steel "T" Rail, etc., which coupled with our long experience, places us in a position to supply your needs efficiently.

Subsidiary of **Taylor-Wharton Iron & Steel Co.**
High Bridge, N. J.

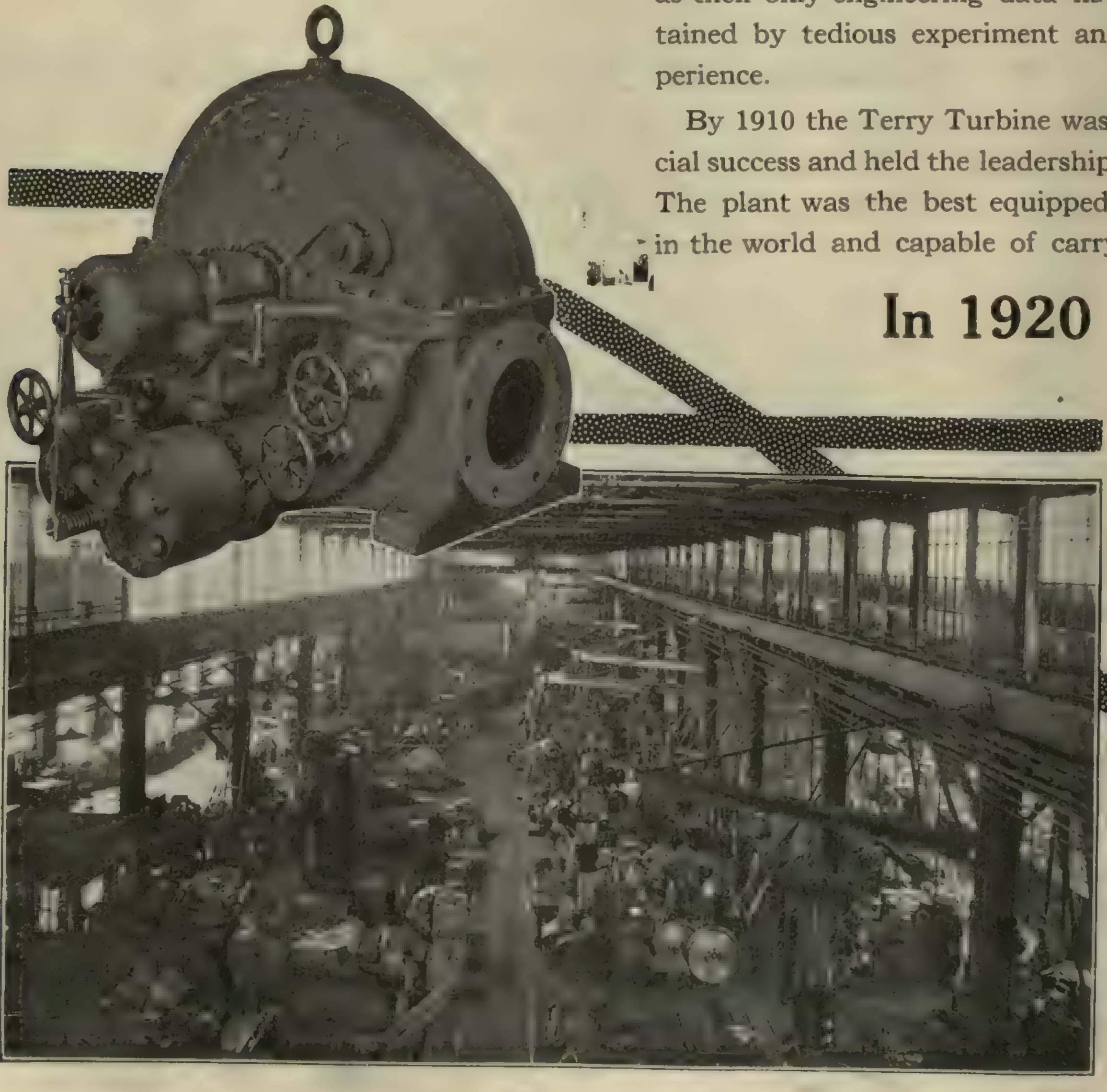
Other Plants:
TAYLOR-WHARTON IRON & STEEL CO., High Bridge, N. J.
PHILADELPHIA ROLL & MACHINE CO., Philadelphia
TIOGA STEEL & IRON CO., Philadelphia



Progress

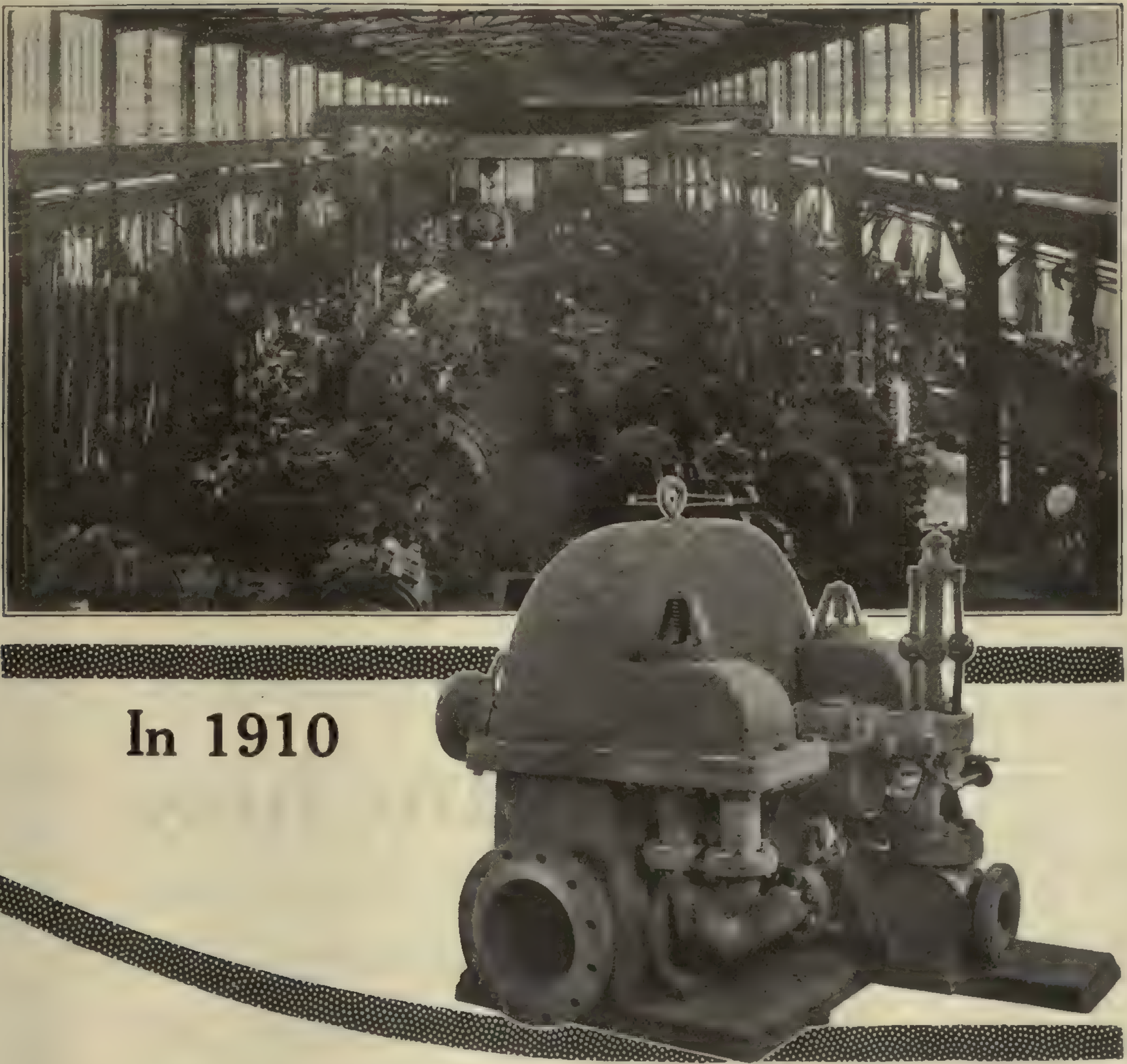
EVERY year since 1903 has marked a long step forward in the progress of the Terry plant and the Terry product. Back in 1903, the plant possessed only an engine lathe, a milling machine and a planer. Only 15 turbines were built during that year but their remarkable success made Terry growth and expansion inevitable. As pioneers in the small turbine field (1 to 1,000 H.P.) their road was a steep and difficult one as their only engineering data had to be obtained by tedious experiment and bitter experience.

By 1910 the Terry Turbine was a commercial success and held the leadership in the field. The plant was the best equipped of its kind in the world and capable of carrying on all



In 1920

7-710



In 1910

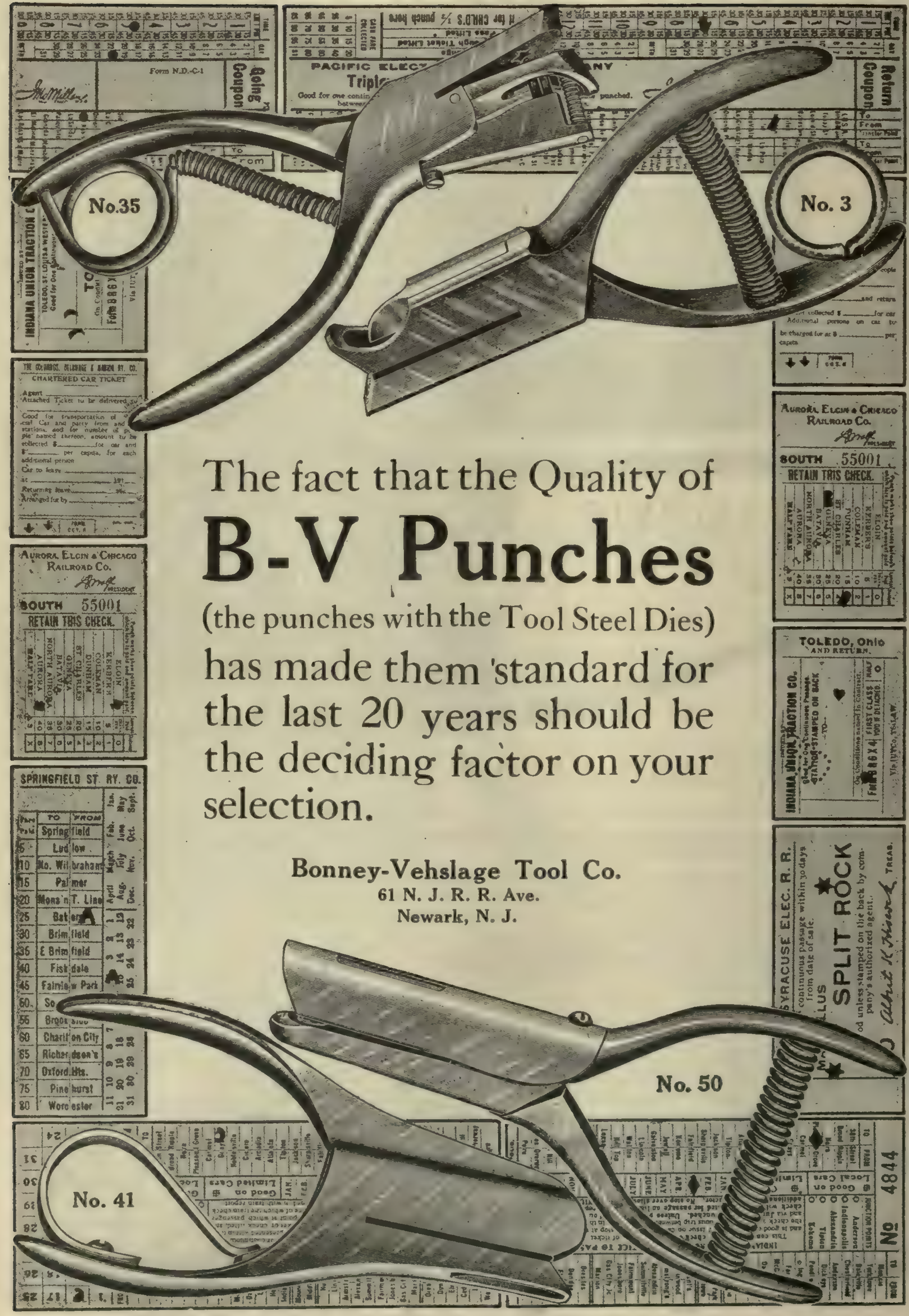
the engineering investigations necessary to the ultimate perfection of its product.

Today, with five times as much floor space and equipment and ten times the experience, the Terry plant is manufacturing a highly refined and superior product. When making comparisons do not neglect this important element of experience. You will not suffer the trouble of 10 years ago, if you—

The Terry Steam Turbine Co.
Terry Square, Hartford, Conn., U. S. A.

Specify

THE TERRY TURBINE



The fact that the Quality of

B-V Punches

(the punches with the Tool Steel Dies)

has made them standard for the last 20 years should be the deciding factor on your selection.

Bonney-Vehslage Tool Co.
61 N. J. R. R. Ave.
Newark, N. J.

Wendell & MacDuffie Company

61 Broadway

New York

Manufacturers' Sales Representatives
and Exporters

Electric and Steam
Railway Equipment

"Seeing Is Believing"

Plan to come to New York either before or after the convention and be sure to visit the

Machinery Department

International Exposition of Industries

GRAND CENTRAL PALACE
New York City

Have You a Permanent Exhibition ?

Railway Supply Men and Electrical Manufacturers, who are represented at the Permanent Machinery Exhibit of the International Exposition of Industries in Grand Central Palace, New York City, know that buyers from all over the United States, Canada, Europe and South America are finding their products because orders are resulting from visits of buyers from all over the world.

This permanent Machinery Exposition is located in the heart of the world's machinery market. The entire exposition contains almost 200,000 square feet of floor space. Here every type of equipment known is displayed and many may be seen in actual operation.

Buyers are taking advantage of the Free Service Bureau, which offers complete office facilities for transacting business and correspondence.

Admission free to everyone.

Have you a permanent exhibit planned? If so, there is no better place for buyers to be able to see, examine and buy than at this permanent machinery market.

Write for list of over 450 exhibitors and full information as to space, rates, etc.

PERFECT

MICANITE

INSULATOR

Reg. U. S. Pat. Off.

Micanite is our trade name for fabricated insulating material obtained by dividing and subdividing the laminae of mica down to films of minute thickness and then reassembling them into a consistent whole. These thin films are fastened together by an insulating cement with the application of heat and pressure. Micanite is therefore an insulator which retains the best physical and electrical characteristics of natural mica while overcoming its limitations.

We manufacture and distribute the following products and will be pleased to send bulletins describing any or all of them.

MICANITE

Commutator Insulators, Tubes, Washers, Rings, Segments, Sheets, Tapes, etc., made of imported mica.

EMPIRE

Linseed Oil Treated Cambric, Linen Silk, Canvas, Duck, Papers and Tubing, High Puncture voltage, long life.

KABLAK

Black Varnished Cambric, Linen Silk, Canvas, Duck and Papers. Flexible, efficient under high temperature.

LINOTAPE

Linseed oil coated tape, both straight and bias cut for coil winding, cable splicing, bus bars, etc.

MICO

Untreated insulating fabrics, Papers, Fibres, Linen Tapes, Armature Twines, Sleeving, Shellacs, Cements and Varnishes.

MICA INSULATOR CO.

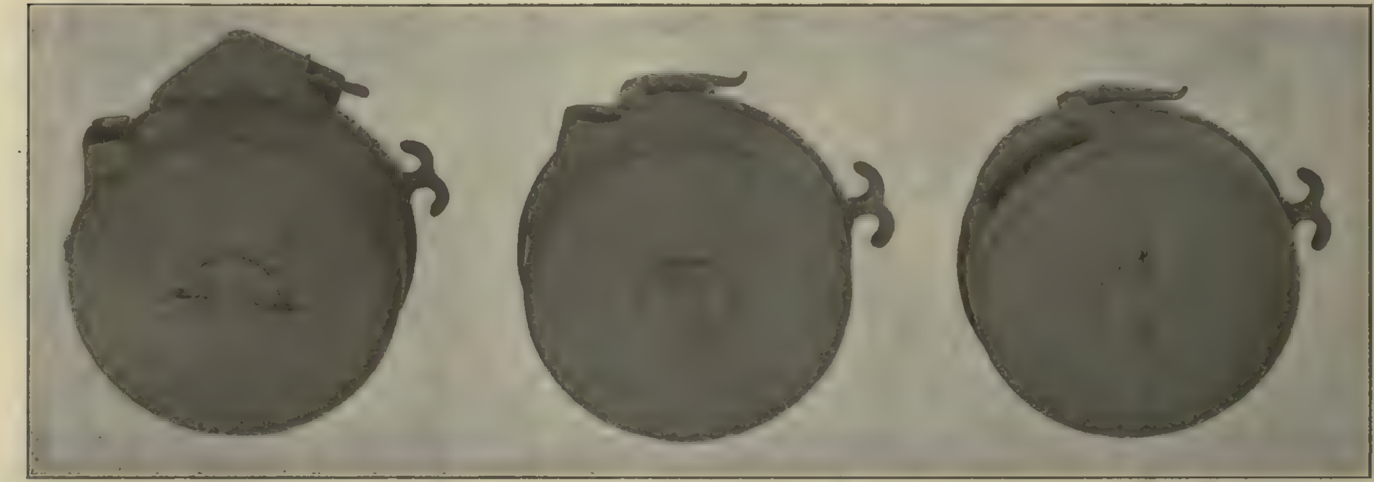
Manufacturers

68 Church Street, New York **542 So. Dearborn St., Chicago**
Works: Schenectady, N. Y.
Victoriaville, Can. **London, England**

THE PERFECT INSULATION

EARLL

Catchers and Retrievers



For Safety Cars **For City Cars**

For High Speed Interurban Cars

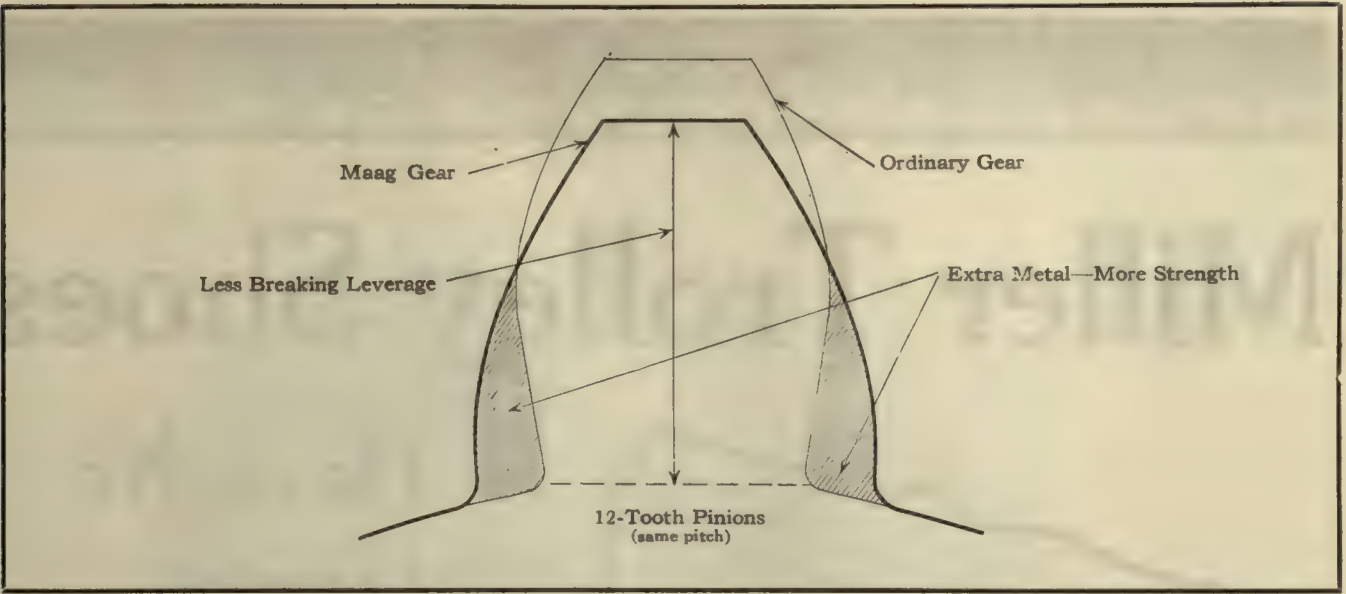
FOR SAFETY CARS use the Earll No. 10 Catcher, or No. 4-A-S Retriever, specially designed for City Service—there are sound reasons for using light Retrievers on Safety Cars.

FOR ORDINARY CITY OR SUBURBAN CARS use the Earll No. 7 or No. 10 Catcher, or the No. 4-A-S Retriever.

FOR HIGH SPEED INTERURBAN CARS use Earll No. 4-A-L or No. 5-A-L Retrievers.

Simplicity of design enables us to produce the lightest Catchers and Retrievers with the fewest and most rugged parts—and, besides, there are the Ratchet Wind, the Emergency Release, the Drum Check, the Free Winding Tension Spring and a number of other valuable features peculiar to the Earll Catchers and Retrievers. Let us explain and demonstrate them to you at Space 633 at the Convention or on your cars at our expense.

C. I. EARLL
York, Pa.



Consider these advantages when applied to Electric Railways

MAAG GEARS

ARE:—

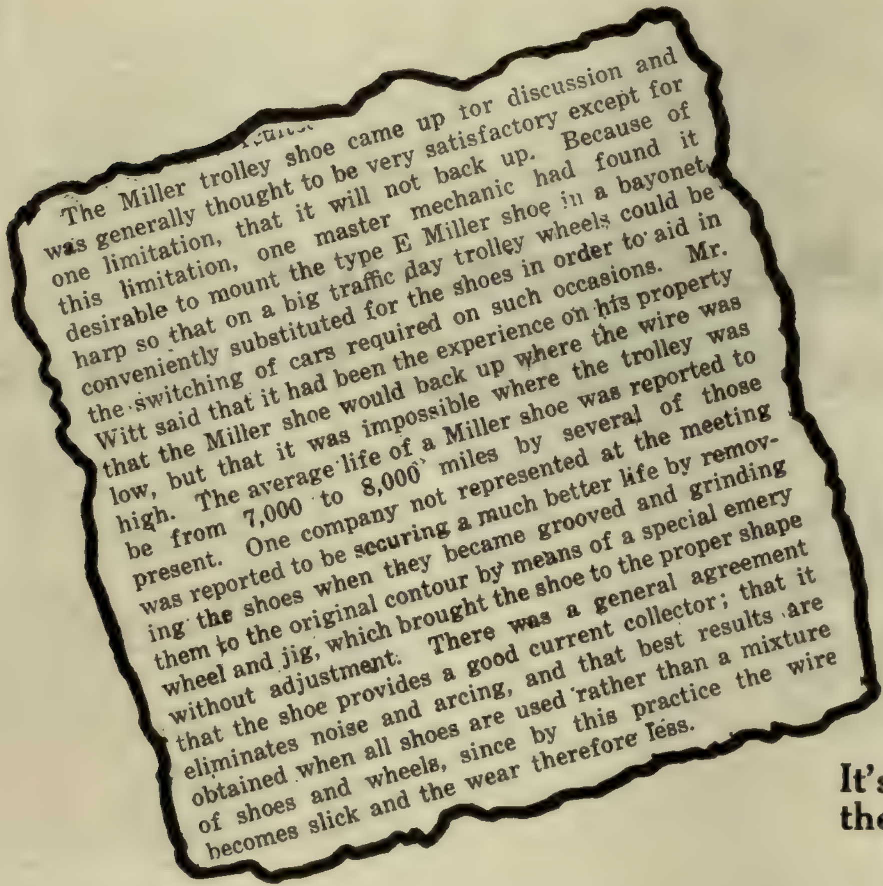
1. **Quiet and Smooth-Running**
   because the ratio of rolling contact to sliding contact between the teeth of the gear and its mating pinion is nearly three times that of an ordinary gear. Rolling contact means quiet operation.
2. **Long-Wearing**
   The line of contact on the outlines of Maag gear teeth is much longer than that on an ordinary gear and hence presents a larger surface for resisting wear. Minimum sliding contact, maximum rolling contact and additional contact surface combine to promote ideal conditions for long life.
3. **Much Stronger Than Ordinary Gears**
   The teeth are shorter and thicker at the base. The combination of more metal at the base and less breaking leverage on this section insures additional strength.
4. **Accurately Cut**
   by means of straight-sided rack cutters working in specially designed machines. The superiority of this method is apparent. The contour of such a cutter is more readily maintained to closer limits of accuracy than the curved surface of a hob or milling cutter.
5. **Furnished for Odd Distances Between Centers**
   The Maag System of gear generation enables the designer to choose any odd distance between gear axes to suit his design without materially changing the desired pitch or ratio.
6. **Made with Large Gear Ratios**
   Heretofore, the noise and lack of strength found in small pinions, necessitated by large gear ratios, have limited the designer's scope of choice. We specialize on large gear ratios and are able to furnish pinions with as few as five teeth without sacrificing the desired quietness or strength. Radial flanks and all forms of undercutting are eliminated in Maag Pinions.
7. **Designed for Constant Velocity Drive**
   Actual tests have demonstrated that Maag Gear teeth drive at a constant velocity throughout their line of contact. With pinions of the ordinary type, the condition of true constant velocity obtains only as the contact point approaches the pitch line. The elimination of this defect does much toward obviating needless noise and vibration.

NILES-BEMENT-POND CO.

111 Broadway New York

Look these gears over
at the Convention
Oct. 11-15
Atlantic City
Booths 104-108

Miller Trolley Shoes



The Miller trolley shoe came up for discussion and was generally thought to be very satisfactory except for one limitation, that it will not back up. Because of this limitation, one master mechanic had found it desirable to mount the type E Miller shoe in a bayonet harp so that on a big traffic day trolley wheels could be conveniently substituted for the shoes in order to aid in the switching of cars required on such occasions. Mr. Witt said that it had been the experience on his property that the Miller shoe would back up where the wire was low, but that it was impossible where the trolley was high. The average life of a Miller shoe was reported to be from 7,000 to 8,000 miles by several of those present. One company not represented at the meeting was reported to be securing a much better life by removing the shoes when they became grooved and grinding them to the original contour by means of a special emery wheel and jig, which brought the shoe to the proper shape without adjustment. There was a general agreement that the shoe provides a good current collector; that it eliminates noise and arcing, and that best results are obtained when all shoes are used rather than a mixture of shoes and wheels, since by this practice the wire becomes slick and the wear therefore less.

Have No Limitations

except one and now that has been entirely eliminated. The latest Miller Trolley shoe which has just been put on the market will back up anywhere on the line just as easily as going forward.

It's the Sparking That Pits the Wire and Wears It Out—
Miller Trolley Shoes Eliminate Sparking

MILLER TROLLEY

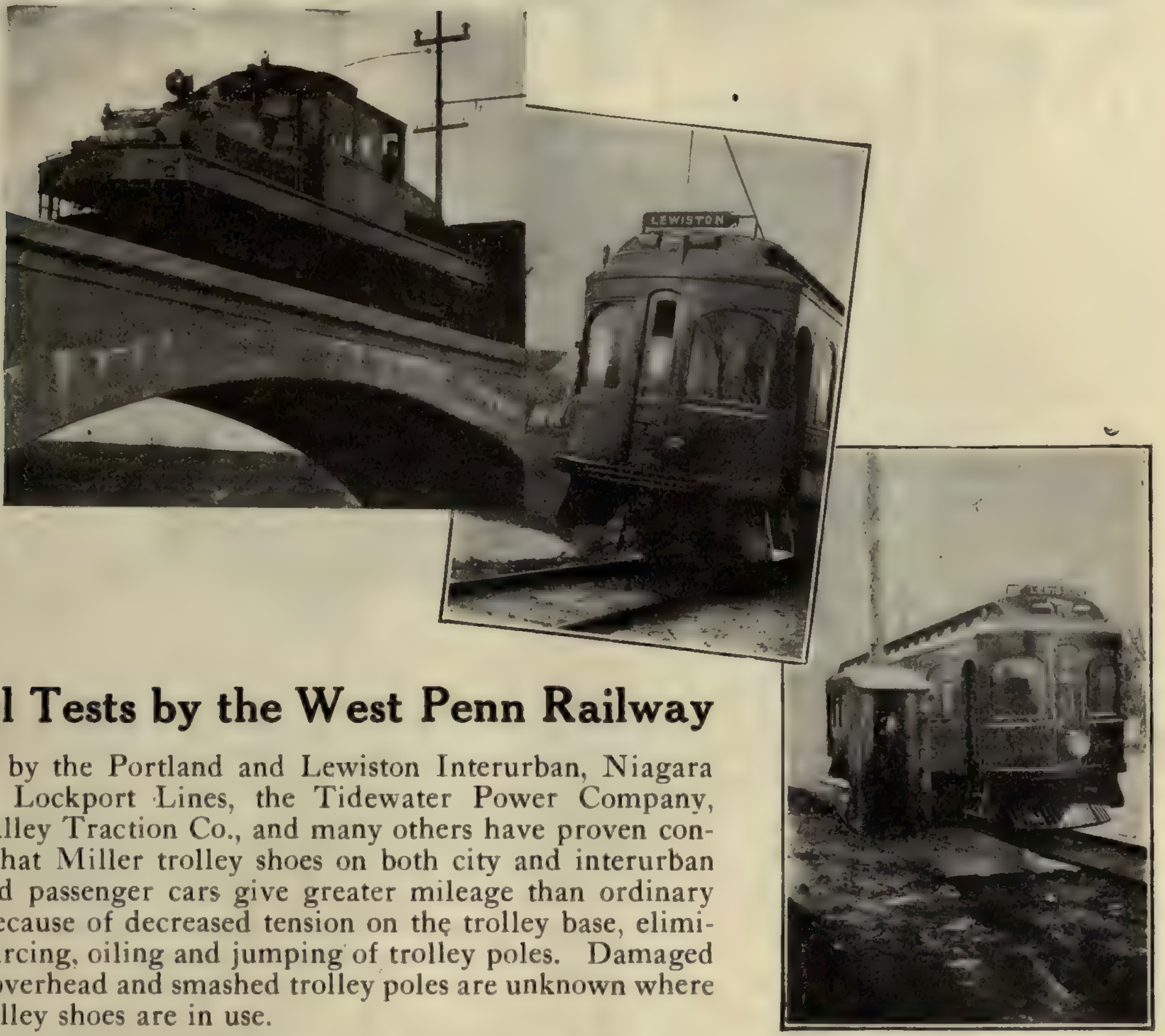
West Newton,

SPECIAL REPRESENTATIVE

EASTERN REPRESENTATIVE: National

SALES

Alfred Connor Denver, Colo.	T. C. White & Co. St. Louis, Mo.	F. F. Bodler San Francisco, Calif.



Careful Tests by the West Penn Railway

as well as by the Portland and Lewiston Interurban, Niagara Falls and Lockport Lines, the Tidewater Power Company, Beaver Valley Traction Co., and many others have proven conclusively that Miller trolley shoes on both city and interurban freight and passenger cars give greater mileage than ordinary contacts because of decreased tension on the trolley base, elimination of arcing, oiling and jumping of trolley poles. Damaged car roofs, overhead and smashed trolley poles are unknown where Miller trolley shoes are in use.

They positively increase Revenue because they lower maintenance costs. *The future standard of all electric railways.*

SHOE COMPANY

Massachusetts

Holden & White, Inc., Chicago

Railway Appliance Co., New York

REPRESENTATIVES:

W. M. McClintock
St. Paul, Minn.

S. I. Wailes
Los Angeles, Calif

W. F. McKenney
Portland, Oregon

Keep the Ma

—and now is the time to consider

Bayonet Sleet Cutters

have no superiors in cutting ice from the wire. If the ice can be removed the Bayonet will do the job. We have the rigid and semi-rotary types (the kind you can back up with) both of which are detachable and interchangeable with the wheel. Only ten seconds necessary to make the change from harp with wheel to one with sleet cutter.

—with BAYONET TROLLEY HARP C

BAYONET

ssesMoving

"U"

"V"

Bayonet Special Trolley Wheels

are made of the very highest grade of metal. No cheap alloys or old trolley wheels recast into new ones. All hand turned, insuring the greatest accuracy and balance. They are known all over the world for their superiority over other wheels, their economical and efficient service having been proved by competitive tests.

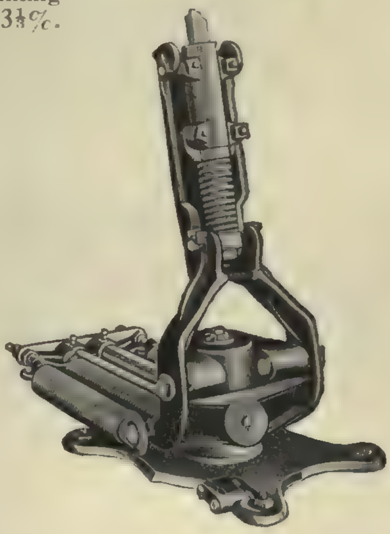
Bayonet Detachable Trolley Harps

are the only harps with which you can change from wheel to sleet cutter or to a new wheel in TEN SECONDS. No tools required on top of the car; only your hand is necessary. All inspections, repairs, adjustments and lubricating are done at the work bench where they are better done. This eliminates unsatisfactory patchwork on top of car, insures perfect running trolleys and increases your trolley wheel mileage at least 33⅓%.

Bayonet Trolley Base With Detachable Pole Clamp

the only trolley base made on which the trolley pole can be changed in
SECONDS and the wheel be in perfect alignment with the wire, and
tools required to do the job. Greatest flexibility of pole action is af-
rded by long extension springs and self lubricated bushings in bearings,
d the roller bearing swivel gives freedom to the rotary motion. It is
constructed that you get a uniform wire pressure at all angles of pole.
ll wearing parts are quickly and cheaply renewed, making the main parts
the base everlasting.

erfect conductivity is afforded by sliding contact between turret and base
ate. It saves your overhead, your wheels and your wire by its freedom
action.



RINGFIELD, OHIO, U. S. A.

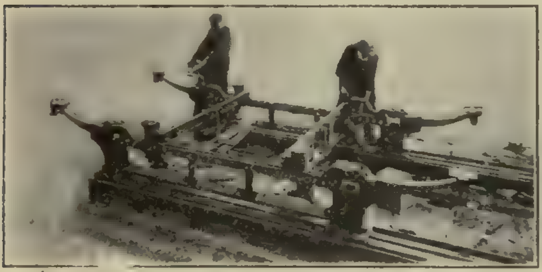
TROLLEY
EQUIPMENT

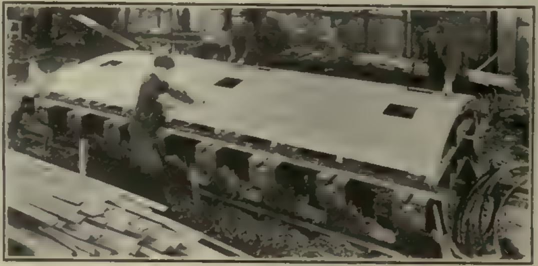
Osgood Bradley
Are Made to Meet Outside

The day of the jumbo car and the unscientifically heavy car is gone forever.

But *sturdiness* in a street car is even more essential than in former times.

Maximum Safety for the car passenger demands that the car shall be strong enough to withstand all but the most severe impacts whether from irresponsible motor vehicles fore, aft or sideways.



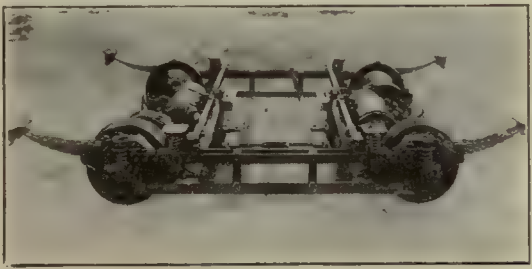


OSGOOD BRADLEY
Builders to Two Generations
WORCESTER,

Safety Cars
Shocks and Inside Overloads

Minimum maintenance for the car operator demands that the car shall be so correctly proportioned that it will carry the inevitable rush-hour overloads without the fracture bending or fatigue of any truck or body members.

These are the principles that are guiding us in the mass production of Osgood Bradley long-life safety cars. They are principles that will help to put more passengers in your cars and less cars in your shop.



CAR COMPANY
of Electric Railway Men
MASS.

Shift Some of That Power Burden
to an
Exide
BATTERY

Standby Service for Exciter Bus

For ensuring continuity in field excitation, railways are using the Exide Battery.

Oil Switch Service

In both power houses and substations, the Exide Battery and the Chloride Accumulator are used to operate oil switches.

Emergency Lighting in the Power House or Substation

The Exide Battery furnishes light for restoring service during an interruption of power supply.

Load Regulation

The Chloride Accumulator is aiding in the carrying of peaks and fluctuations of load.

Multiple Unit Control

A number of railways use the Exide Battery and the Chloride Accumulator to furnish a supply of low voltage current in connection with the operation of multiple unit control systems.

Interurban Car Lighting

Exide Batteries are being used to maintain steady illumination, and to guard against interruption of lighting at highway crossings and switches.

Head and Tail Lights

Exide Batteries are giving ideal service for this purpose during interruption in power supply.

For Testing in Electrical Repair Shop

The Exide Portable Battery is used, and a special battery of this type has been designed for high discharge rates.

Storage Battery Cars

The Exide Batteries are economically and profitably solving the problem of car operation where other methods cannot be used to advantage.

Fuller information will be supplied upon request.

THE ELECTRIC STORAGE BATTERY CO.

Oldest and largest manufacturers in the world of Storage Batteries for every purpose

1888 PHILADELPHIA 1920

Branches in seventeen cities

Special Canadian Representative: Chas. E. Goad Engineering Co., Limited, Toronto and Montreal

Service

ACROSS the broad pages of history, the United States Navy has written the record of an exceptional *Service.*

Today The Thew Shovel Company is rendering to Power Shovel Owners a *Service* that is exceptional in its concept and completeness. From the purchase of materials down along the line of design, construction, delivery, and expert advice during the entire life of the shovel; *Service* is the potent factor that makes the Thew Shovel different, and better than any Power Shovel on the market.

THE THEW SHOVEL COMPANY
Lorain, Ohio

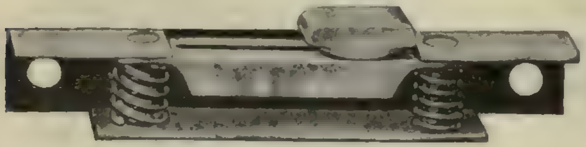
Thew
Power Shovels

Philadelphia Rapid Transit cars equipped with Edward Window Brakes

Safety Car at Fort Worth equipped with O. M. Edwards Fixtures

Eliminate Window Troubles With Edwards Compression Brake Device

as the Philadelphia Rapid Transit Company has done on 1500 of its cars. Edwards window brakes permit the window to be raised easily but automatically retard the downward movement. It may be fastened either to the sash or to the edge of the stop casing next to the sash.



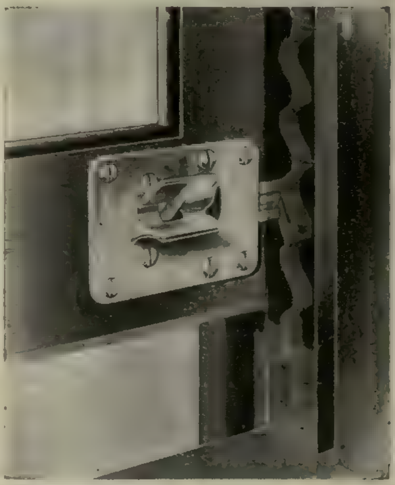
Edwards Compression Brake Device Prevents

claims resulting from injuries to passengers by dropping windows or falling glass. When the sash is raised, the sliding shoe, pictured above, slides automatically to the bottom and compresses the weaker of two springs, allowing the sash to be raised.

When the sash is lowered, the shoe automatically slides to the top and compresses the heavy spring. The increased pressure gives sufficient friction to prevent the sash from falling.

Edwards Safety Sash Lock for the One-Man Safety Car

is the best because it positively locks. It consists of two compression devices, a sash lock and a lift. One compression device is applied to the sash near the top corner at the right hand side. The other one is applied to the sash near the center. These hold the sash firmly against the outer stops with a yielding pressure, preventing rattle and maintaining a tight joint.



Sash Lock with Phantom view of rack in wood stop casing.

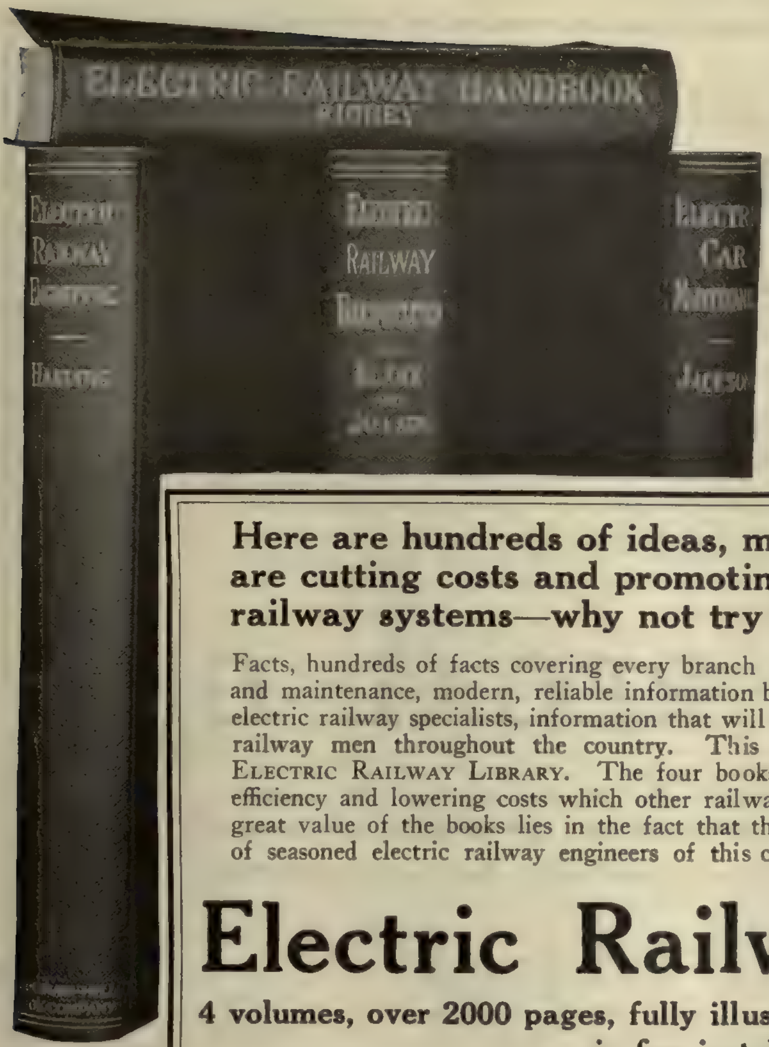
From Tampa to Seattle and from Maine to California O. M. Edwards installations of window locks and sash fixtures stand out as the logical choice, the latest up-to-date equipment. Stone & Webster as well as many other operating companies have specified O. M. Edwards fixtures to such an extent that they have been specified as standard on Birney Safety Cars.

Edwards Window Fixtures are standard on Birney one-man safety cars.

O. M. EDWARDS CO., INC., SYRACUSE, N. Y.

Manufacturer of:

Window Fixtures **Sash Balances**	**Top, Bottom and Side** **Weather Stripping**	**Metal Extension Platform** **Trap Doors**	**Metal Stop Casings** **Railway Devices**



Railway Executives—

These books will save your company dollars every week.

Here are hundreds of ideas, methods and suggestions that are cutting costs and promoting business for other electric railway systems—why not try them out on your lines?

Facts, hundreds of facts covering every branch of electric railway construction, operation and maintenance, modern, reliable information based on the experience of four of the biggest electric railway specialists, information that will help you as it is helping hundreds of electric railway men throughout the country. This is the kind of material presented in the ELECTRIC RAILWAY LIBRARY. The four books point out ways and means of increasing efficiency and lowering costs which other railway companies have found successful. The great value of the books lies in the fact that they bring together the cumulative experience of seasoned electric railway engineers of this country.

Electric Railway Library

4 volumes, over 2000 pages, fully illustrated, $16.00 postpaid, payable in five installments

Some of the topics these four books cover are:

- Roadbed and track.
- Buildings and their efficient use.
- Train movement.
- Railway motors.
- Rolling stock and its upkeep.
- Signals and communication.
- Adjustment of service to traffic.
- Accelerating traffic movement along the line.
- Car types in relation to traffic.
- Fare collection practices and devices.
- Public relations.
- Promotion of traffic.
- Traffic signs.
- Information for the public.
- Wages and wage agreements.
- Selection and training of men.
- Discipline of trainmen.
- Traffic studies.
- Power generation and distribution.
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We are so convinced of the value of this library that we invite you to use the books for ten days without charge. You simply agree to return the books, postpaid, within 10 days of their receipt or to remit $2.00 and $3.50 each month thereafter for 4 months until the total price of $16.00 is paid. Put the coupon in your outgoing mail today.

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For Turbine Lubrication

Good Oil is a Most Important Factor

A constant stream of clean, cooling oil must be supplied to the bearings at all times. ¶The oil must not emulsify nor form deposit of any kind and must free itself from any moisture entering the system. ¶It must also maintain a uniform quality over long periods of time.

TEXACO REGAL OIL

A special product for a special purpose which meets perfectly turbine conditions

TEXACO REGAL OIL is only one of the many Texaco Lubricants made for special purposes.

There is a Texaco Lubricant for every mechanical appliance in the shop as well as in the power plant.

Consultation with Texaco Lubrication Engineers regarding any or all of your lubricating requirements is invited.

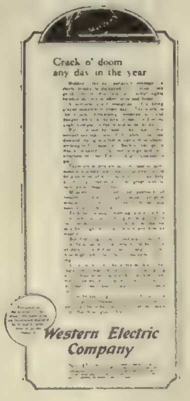
And don't forget to ask us about Texaco Crater Compound, the Great Gear Lubricant and our Texaco Car Oils.

The Texas Company

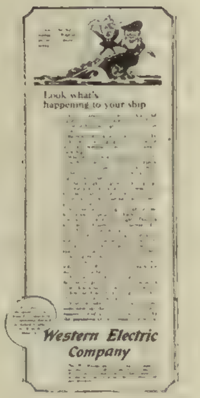
Dept. RJ 17 Battery Pl., N. Y. C.
New York Chicago Houston

Offices in Principal Cities

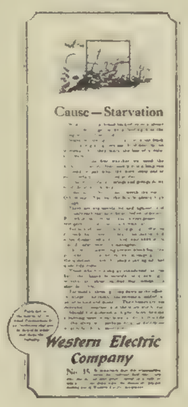
FOR BETTER PUBLIC RELATIONS


Crack o' doom
any day in the year

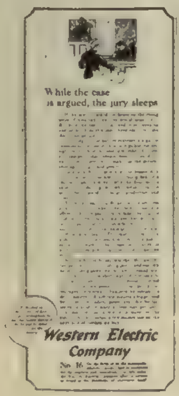
Western Electric
Company


Look what's
happening to your ship

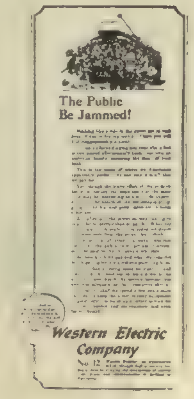
Western Electric
Company


Cause—Starvation

Western Electric
Company


While the case
is argued, the jury sleeps

Western Electric
Company


The Public
Be Jammed!

Western Electric
Company

Look for Them at the Convention

When you are in Atlantic City attending the A.E.R.A. Convention, be sure to see the Western Electric Company's Advertising Campaign, "For Better Public Relations," which is now appearing in the popular magazines of the country. Enlarged copies of the series will be on exhibition in space 301-3-5.

It is the purpose of this campaign to create good will on the part of the public toward the public utilities. We are running this campaign because we know whatever helps the industry will in a measure help us.

These advertisements are available in pamphlet form under the caption, "For Better Public Relations." You can procure a copy at the convention.

Western Electric Company
INCORPORATED
Offices in All Principal Cities

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Single Register

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INTERNATIONAL Fare Registers through the test of long service have shown themselves to be not only accurate and reliable in their registration, but so rugged in construction as to give enduring service. All parts are interchangeable, repairs few and easily made.

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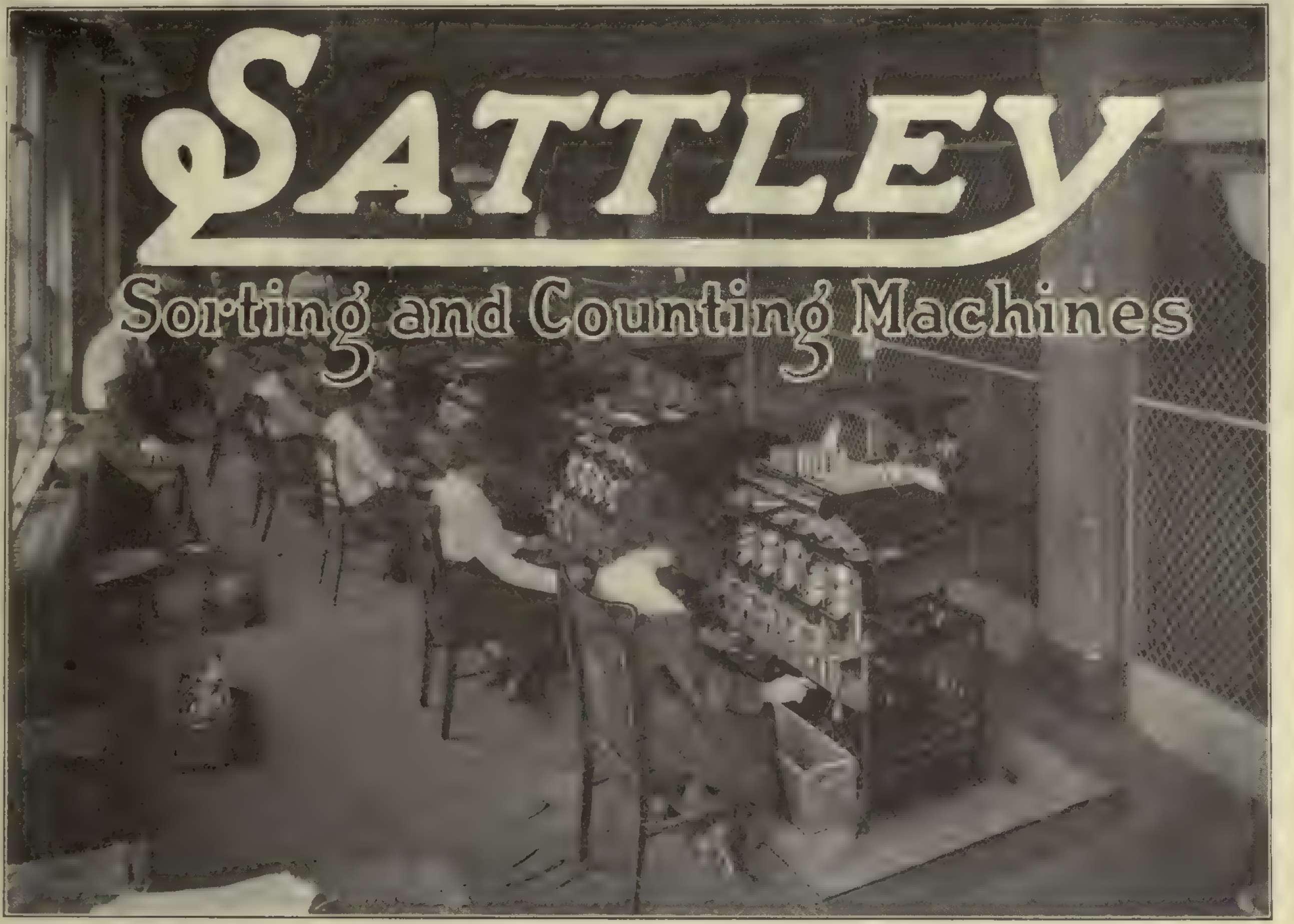
Manufacturers of Fare Registers and Railway Supplies, and General Selling Agents for HEEREN ENAMEL BADGES

Office and Factory: 15 So. Throop Street, Chicago, Illinois



These machines counted, sorted, wrapped, totalled and sub-totalled $84,000 in pennies, nickels and dimes in one day for the Detroit United Railways.

Each machine saved 6 employees. This is the type of machine adopted by the Federal Reserve Bank of New York.

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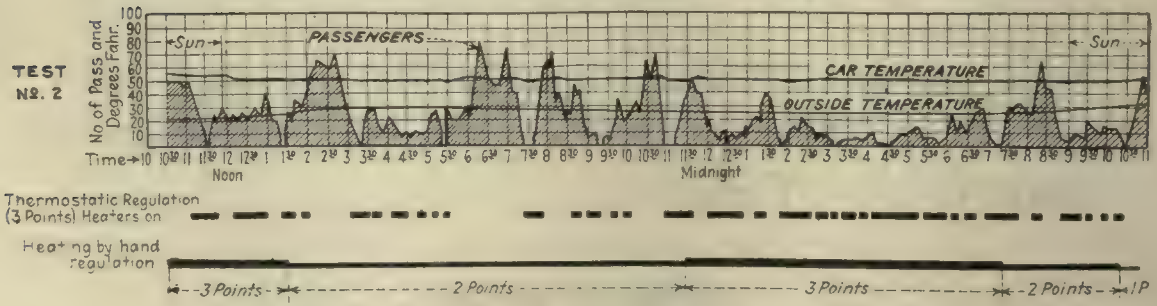
Saving 35%

A TEST on the Third Avenue Railway, New York, which was reported in Electric Railway Journal of June 19, 1920, showed a power saving of a little better than 35 per cent due to regulation of car heating by the Utility Thermometer Control.

The chart at the bottom of this page shows the outside temperature ranging from 22 to 32 degrees, the inside temperature constant at 50 degrees. Hand regulation, shown by the bottom line, is arranged for three intensities of heat, and was plotted more accurately than would be possible in actual service. Actual consumption under Utility regulation was 87.84 kw. hours and the calculated consumption under proper hand regulation would have been 135.7 kw. hours, showing a saving of 35.26 per cent due to Utility Thermometer Control.



TEMPERATURE TEST NO. 2, USING THERMOSTATIC CONTROL

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The practical realization of the ideal toward which progressive pole users and manufacturers have long been striving.

WITH Page & Hill Co., pioneers in the pole industry, has been developed this revolutionary process of Butt-Treatment that positively insures a uniform one-half inch depth of penetration throughout the groundline area of the treated portion of every pole. Thus is insured the maximum number of added years to the life of poles so treated. This means that your pole difficulties are over.

Under the P & H Process your poles are absolutely insulated against decay.

What this means to you is easily summed up in a few all-important points:

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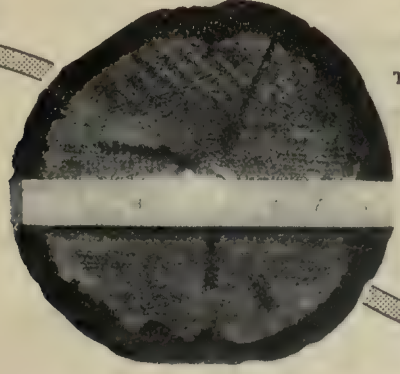

Sample selected at random, showing the uniform one-half inch penetration.

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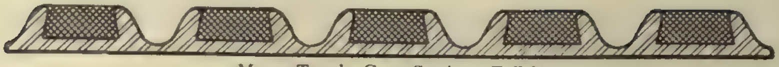
We Know of No Accident Claims Paid Where MASON SAFETY TREADS Are Used



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That is a record to be proud of when one considers the more than 6,000,000 square feet in use and the millions that pass over them safely every day

—and also, a record that should carry a great message to the railway official who knows the economy of safety.

MASON Safety Treads always assure a safe foothold because of their superior construction. The rolled steel base has alternate dovetail and V-shaped grooves, the dovetailed grooves being filled with lead or carborundum. The open ends of the grooves allow moisture to run off freely, thus keeping the filling dry and clean.

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are the only sanitary, self-cleaning, non-slipping car steps in service—mud, dirt and snow cannot stick to the honeycomb surface. Made of high carbon steel, in single, double, triple and folding type; in satisfactory service on over 100 electric lines.

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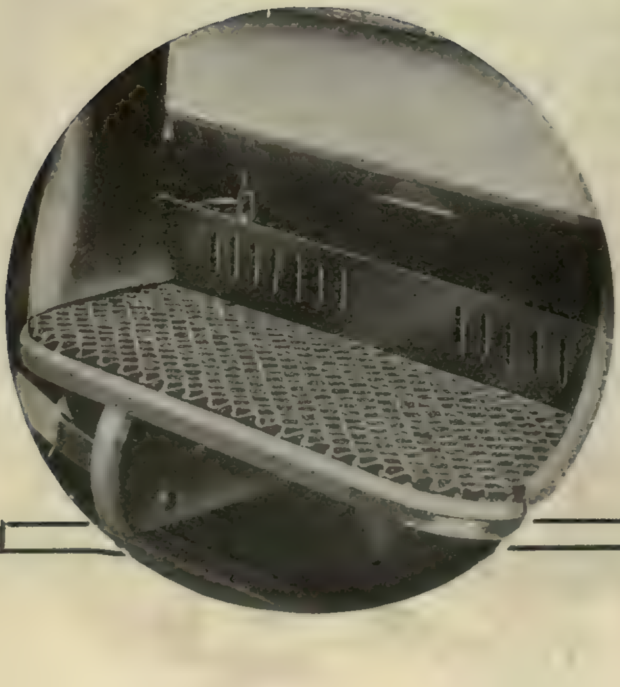
The ideal flooring for steel cars. Laid in plastic form, it will not crack or chip, and is sanitary, fireproof and of light weight. And it *lasts.*



Ask us to send *facts* and *figures* regarding uses of Safety Treads.

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VAN DORN Couplers and Draft Gears are made in various types and sizes to meet the entire range of requirements of modern electric car operation.

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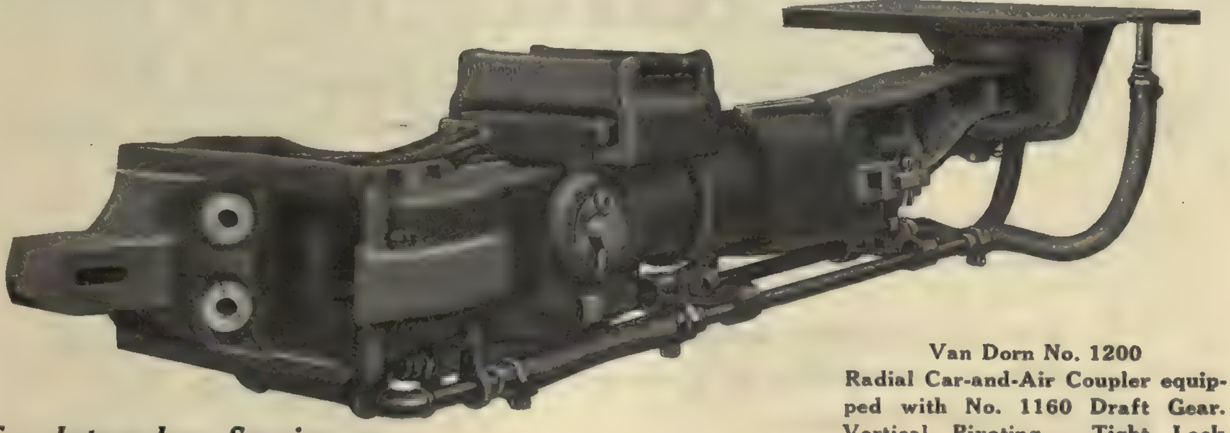
For Couplers where both car-and-air connections are desired the Van Dorn No. 1200—pictured below—is unsurpassed. This couples both car-and-air connections automatically, and is capable of handling several interurban cars in a train.

Very important features embodied in this Coupler are:

(1) Vertical Pivoting Head, which allows free vertical movement by pivoting when operating a train of cars over severe breaks in grade, thereby relieving practically all other than normal platform strains.

(2) The Tight-Locking device in each coupler, which insures positive locking in coupling. These locks are so constructed that they take up all wear and keep the Couplers locked tightly together, thus effecting perfect air connections. The positive, independent locks, which couple simultaneously, produce maximum traction strength—this latter feature insuring perfect operation in pulling a train of interurban cars.



Van Dorn No. 1200
Radial Car-and-Air Coupler equipped with No. 1160 Draft Gear. Vertical Pivoting — Tight Lock

For Interurban Service

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Reinforced Diamond "S" is the Best Type

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He is tamed by association, and quickly sees that when he follows the lead of his well-fed brothers he too becomes well-fed.

In spite of his thick hide, the things he sees about him quickly seep through and make an impression.

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But they *all* don't do it.

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And, worse yet, the coal was so much poorer in quality, that it needed thousands of tons more to get the same kw. hour output. Conditions today are no better with embargos ever pending.

But with the installation of a Quigley Powdered Fuel System, neither this nor any other electric railway will have to show concern about the scarcity and high cost of good coal because the QUIGLEY SYSTEM

Assures Cheap Power from Plentiful Low-Grade Fuels

for the two-fold reasons that it enables you to get more heat units with less labor and less maintenance than the traditional type of stokers and furnaces.

Quigley Furnace Specialties Company, Inc.
Engineers and Contractors for Complete Systems for Preparing, Transporting and Burning Powdered Coal
26 Cortlandt Street, New York, N. Y.

The Place to Start Power Saving is

Fuel System Means to

Your Transportation

You know what conditions your power plant must face during the rush-hours—the terrific upward jump in the power requirements as the service is doubled and the lights go on.

But we are anxious to tell you how you can meet these sudden increases in demand faster and at less cost. Whether or not you can undertake to install the Quigley Powdered Fuel System for all your plant now, we are sure you will want to consider it for partial installation for the sake of the

Almost Instantaneous Response to Peak-Load Requirements

which you will thereby obtain, thus enabling you to keep up your voltage, and consequently your schedule speeds, to efficient standards when efficiency is most necessary. Bulletin 11-J on request.

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CABLEWAY ———Automatic Single Rope. A clamshell bucket installation operated completely by a single drum non-reversing hoist.
FOUR LINE and Special Buckets for every rig and every class of service.

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Blaw Buckets are made in a variety of types and sizes applicable to every conceivable type if hoisting equipment.

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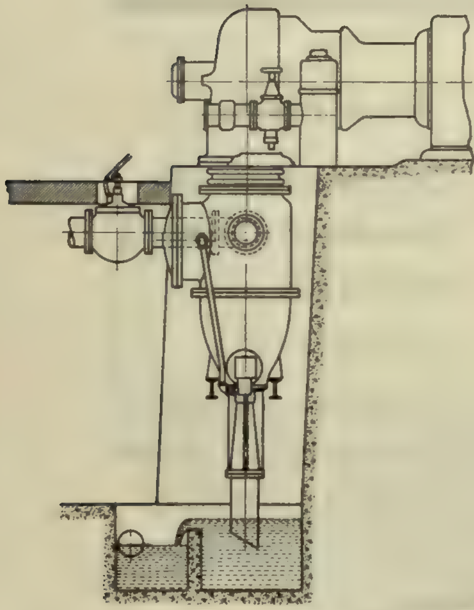

They are the only low level condensers that will produce and hold a high, steady vacuum without an Air Pump.

They are adapted to a great variety of operating conditions.

The compact design is exceedingly simple and includes no moving parts inside of the condenser.

Contain no stuffing box under vacuum.

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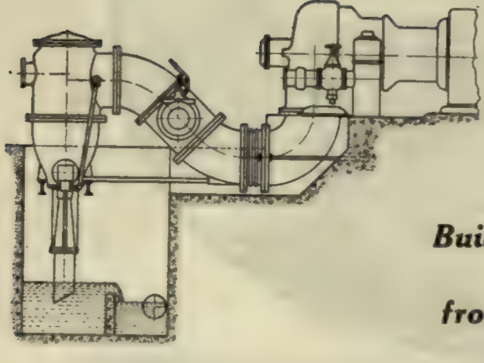

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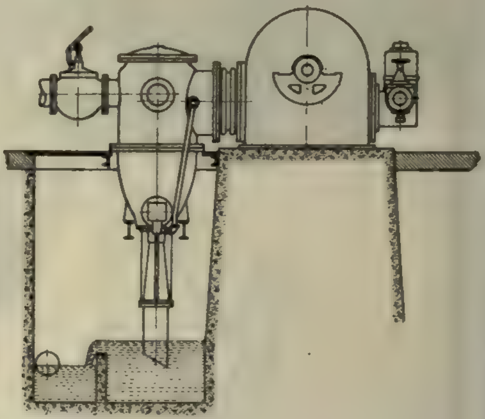
from 100 kw. to 10,000 kw.



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Write us for Bulletin No. 5-AB.

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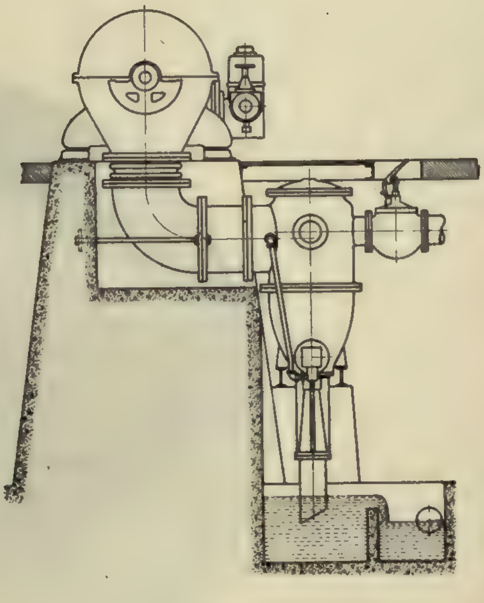

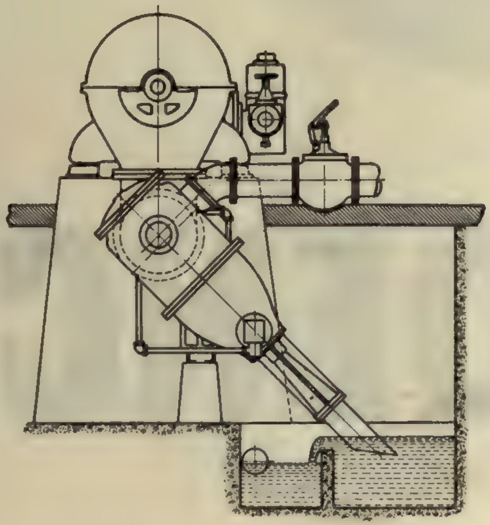

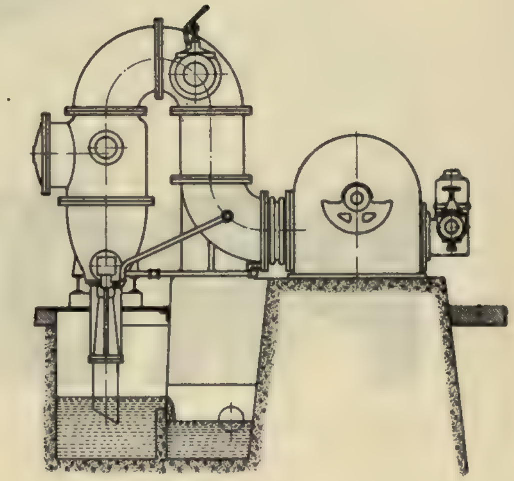

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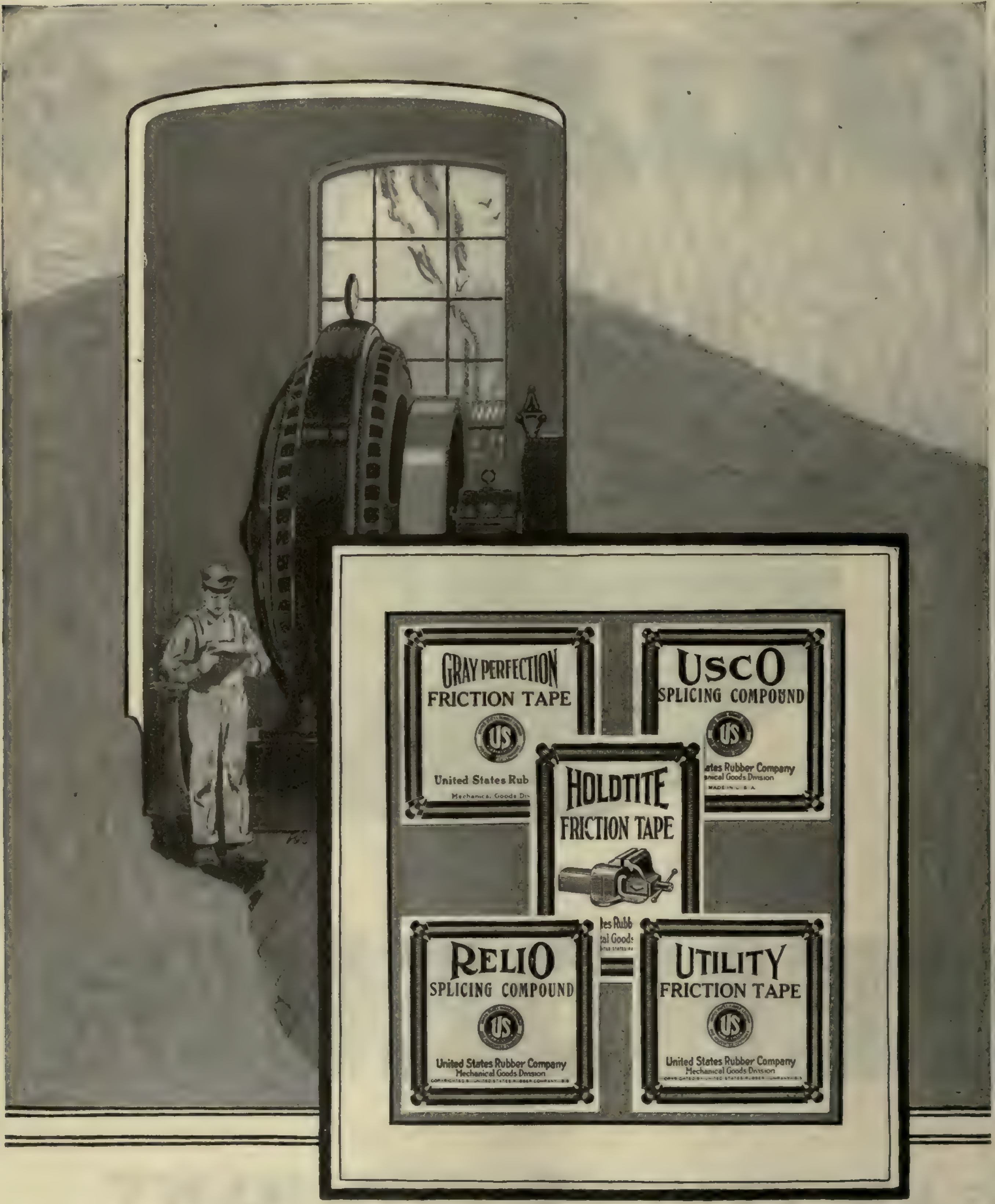

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United States Splicing and Friction Tapes have gained their reputation for quality and durability during many years of service under varying conditions. They give the best taping results, according to experienced workmen.

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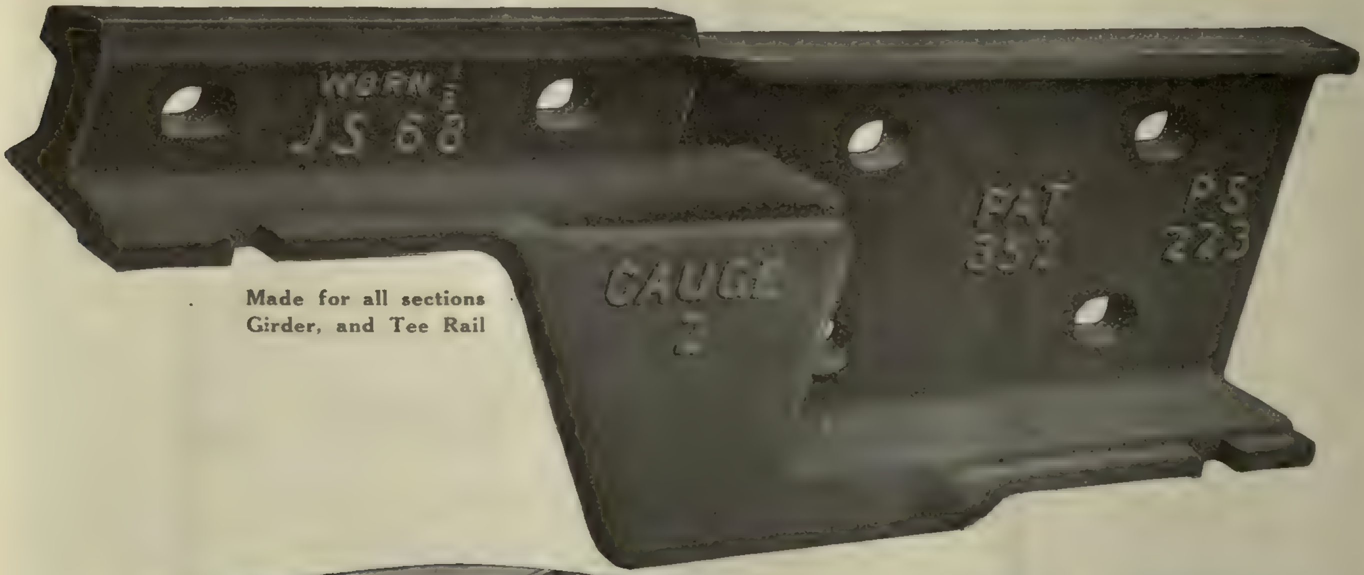

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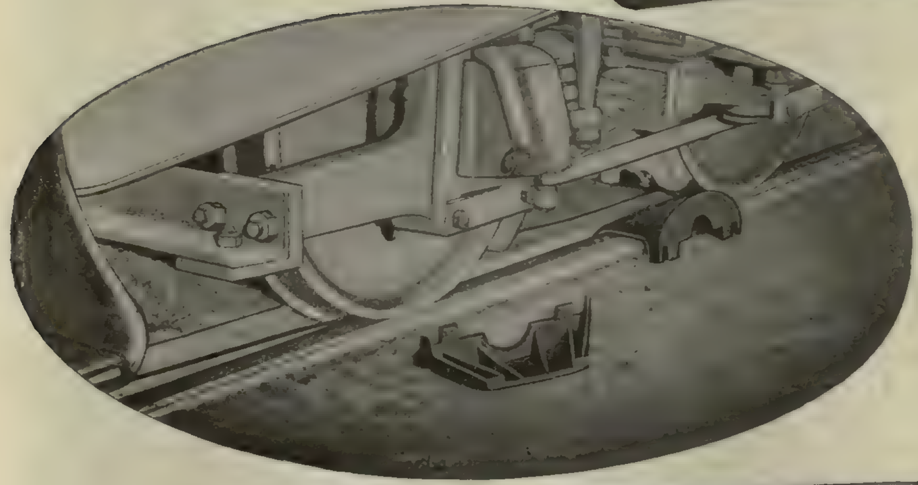
Reading Replacers get the car back on the track the first time. A number of types for light and heavy service. Reading Cast Steel Rail Braces are three times stronger than malleable iron. Made for all rail sections. Send for catalog of all the Reading Specialties.



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Strength, safety and durability are recognized characteristics of Duff Jacks.

This reputation is due to the high quality of materials from which they are made.

Practically all Duff Jack parts are of steel, drop forged under mighty hammers in our own up-to-date forge shop.

The forging process, plus fine steel of special composition, insures strength and reliability.

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Duff Jacks for Electric Railways include Emergency Jacks, Track Jacks, Car Repair Jacks, and Pit Jacks. Write for complete information.

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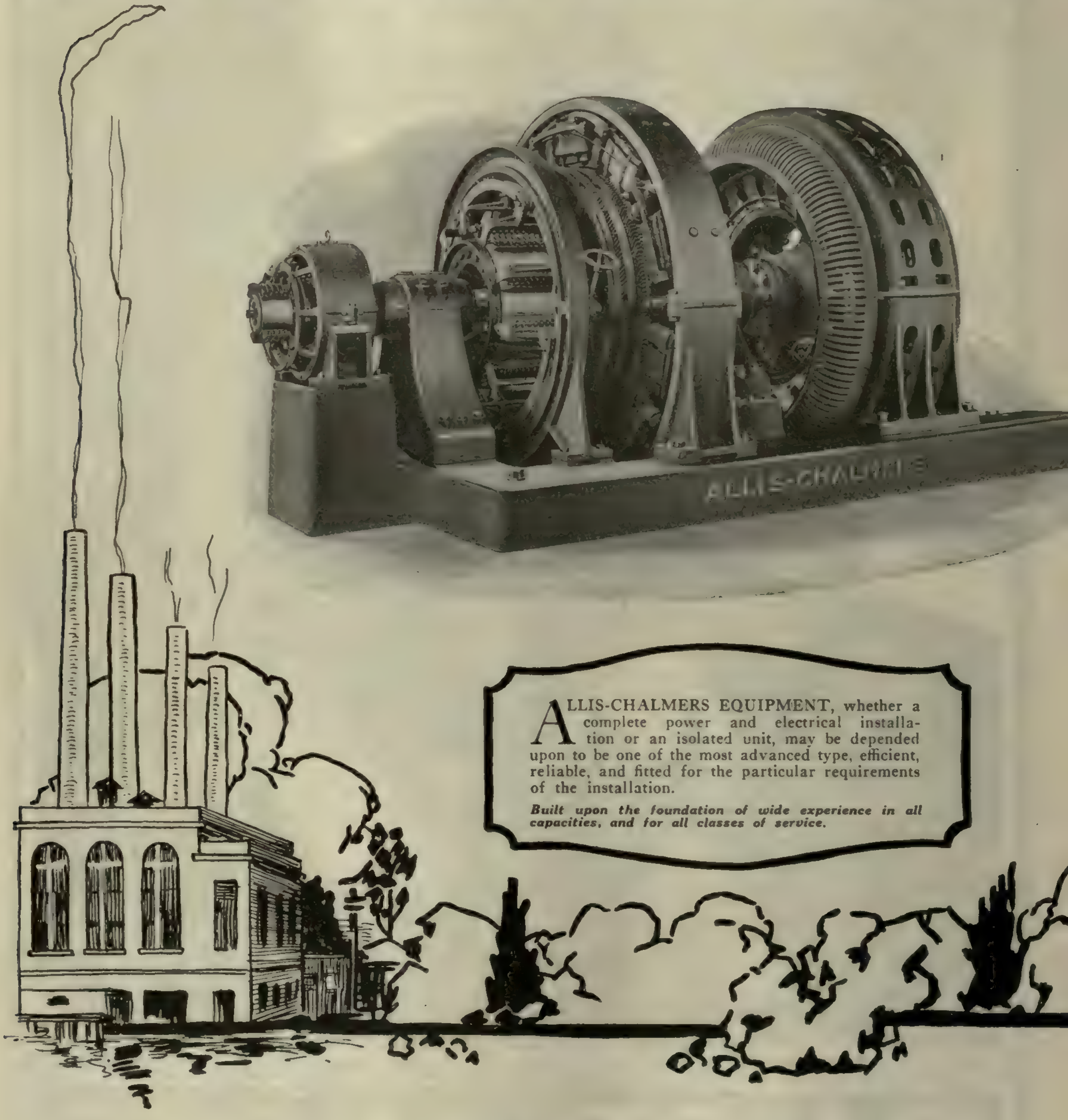

ALLIS-CHALMERS EQUIPMENT, whether a complete power and electrical installation or an isolated unit, may be depended upon to be one of the most advanced type, efficient, reliable, and fitted for the particular requirements of the installation.

Built upon the foundation of wide experience in all capacities, and for all classes of service.

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Allis-Chalmers Steam Turbines built in sizes from 200 kw. up, are efficient, reliable, and easily accessible for inspection.

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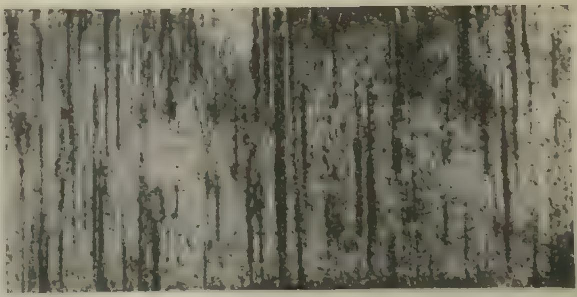
MANUFACTURING CO.
ELECTRICAL EQUIPMENT
Milwaukee, Wisconsin.

"Crushed and split heads and broken bases cause 90 per cent. of rail failures"

"Ninety per cent. of the rail failures can be divided into two general classes," says M. H. Wickhorst, discussing a report of the rail committee of the American Railway Engineering Association. *"First, crushed and split heads, and second, broken bases. The latter can usually be traced to a seam in the bottom of the base. Fifty per cent. of the rail problem consists in getting sound metal of even composition, and 40 per cent. consists in so rolling steel as to avoid seams in the base."*



ig. 1—Full sized portion of typical rail base, etched to show prevalence and magnitude of longitudinal seams

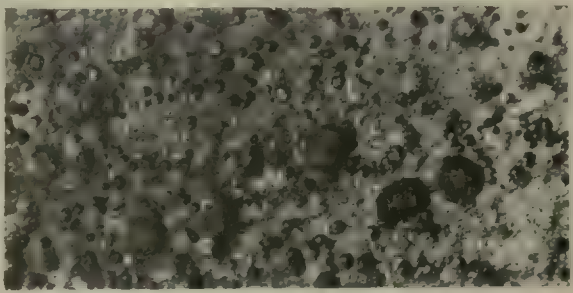


Fig. 2—Full sized surface section of an ingot, showing the disc-like surface flaws.

Lackawanna Deseamed Rails

are free from the weak surface metal which ordinarily causes crushed and split heads and broken bases

A series of minute seams exists in the surfaces of all rails made in the ordinary way, these seams being principally in the head and base. The seamy base, however, is the dangerous part, because seams at this point may, after the rail has seen more or less service, develop into longitudinal cracks, which ultimately lead to complete failure of the rail. The output of an individual mill may at times approach nearer the desired state of excellence, but heretofore the seams have invariably been present. The prevalence of such seams is illustrated by Figure 1, which shows a typical etched rail surface. Past attempts to eliminate this defective surface have failed because of a condition inherent in the ordinary process of steel making and beyond the control of the manufacturer.

The defects originate while the molten metal is being poured from the ladle into the ingot mold. Air entrapped against the sides of the mold by the rising metal forms small disc-like apertures or flaws on the surface of the ingot. Figure 2 shows many of these indentations as they appear on the face of an ingot.

There is also a partially decarburized (and therefore softer) surface about 5/16 of an inch in depth enveloping the ingot on all four sides, and varying from 8 to 10 points lower in carbon than the metal immediately underneath. This weak, defective and partially decarburized envelope is undoubtedly produced in the soaking pits, where there is so much oxidation that a thick oxide is

ALL LACKAWANNA RAILS ARE DESEAMED

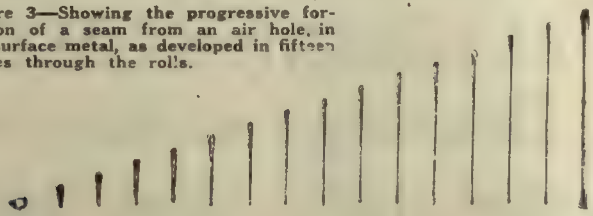


Figure 3—Showing the progressive formation of a seam from an air hole, in the surface metal, as developed in fifteen passes through the rolls.

always formed on the surface of the ingot. That such a layer of lower carbon steel actually exists is shown in Figure 4, which represents part of an ingot section machined, polished and etched. This sample was taken after the ingot had been introduced into the soaking pit and heated to a rolling temperature, but not rolled. This ingot also showed the characteristic disc-like indentations as well as the decarburized surface on its outside faces at the time it was ready to be rolled.

The development of the surface flaws or holes into seams on the finished rail is indicated in Figure 3. Starting at the spot shown on the left, the disc-like aperture is gradually changed in the reducing drafts of the rolls until it becomes a finely drawn outline or seam.

During the rolling operation, the partially decarburized surface of the four faces of the ingot, which averages 5/16 of an inch in thickness, becomes gradually thinner as the reducing drafts elongate the metal, so that in the finished bar this softer, weaker layer of metal varies from .01 to .04 inches in thickness. It is this soft surface that under the cold rolling action of the wheels causes rail heads to slough off in service and form fins.

The surface seams, running as they do in a longitudinal direction, tend to weaken the rail section against cross stresses. (The action and direction of stresses in a rail in service, especially in the rail base, are alternately longitudinal and transverse.) When the stresses are transverse or at right angles to the direction of the seams, a rupture often results that follows along the seam, ultimately leading to partial or complete fracture.

Here is the way a prominent authority puts it: "Rails strained in a crosswise direction fracture with great brittleness, when, for example, the flanges are bent crosswise.

"So far as known, there is no material difference between the streaks and laminated seams of the head and those of the base, excluding those of the base which chance to have their origin in laps during rolling. Wherever there is a lack of structural continuity in the steel, brittleness may prevail when the steel is overstained at right angles to that discontinuity. Overstraining more readily occurs in the base or in the flanges of the base than in the head of the rail; that is, the stresses may more readily reach the necessary maximum in the base. For this reason, probably, flange breaks are more numerous than split heads. Defects in the base are of a more grave character and lead to more rail fractures than defects which are in the head. Incipient longitudinal cracks have also been found in the heads of rails, and those incipient cracks have been on the lines of streaks."

These conditions, which are by no means exaggerated, explain why all rail makers have sought for many years to roll their products free from seams and other surface defects. The only practical solution that has ever been offered is the Lackawanna Deseaming Process, originated and controlled exclusively by us and applied to all Lackawanna Rails of 50-pound per yard and heavier section.

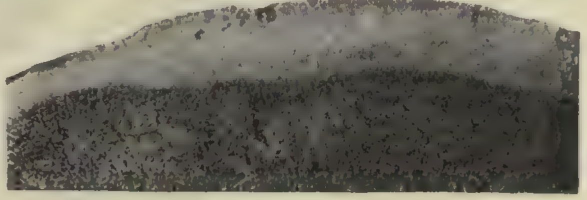


Figure 4—Section of ingot machined, polished and etched to show surface shell of weak and partially decarburized metal.

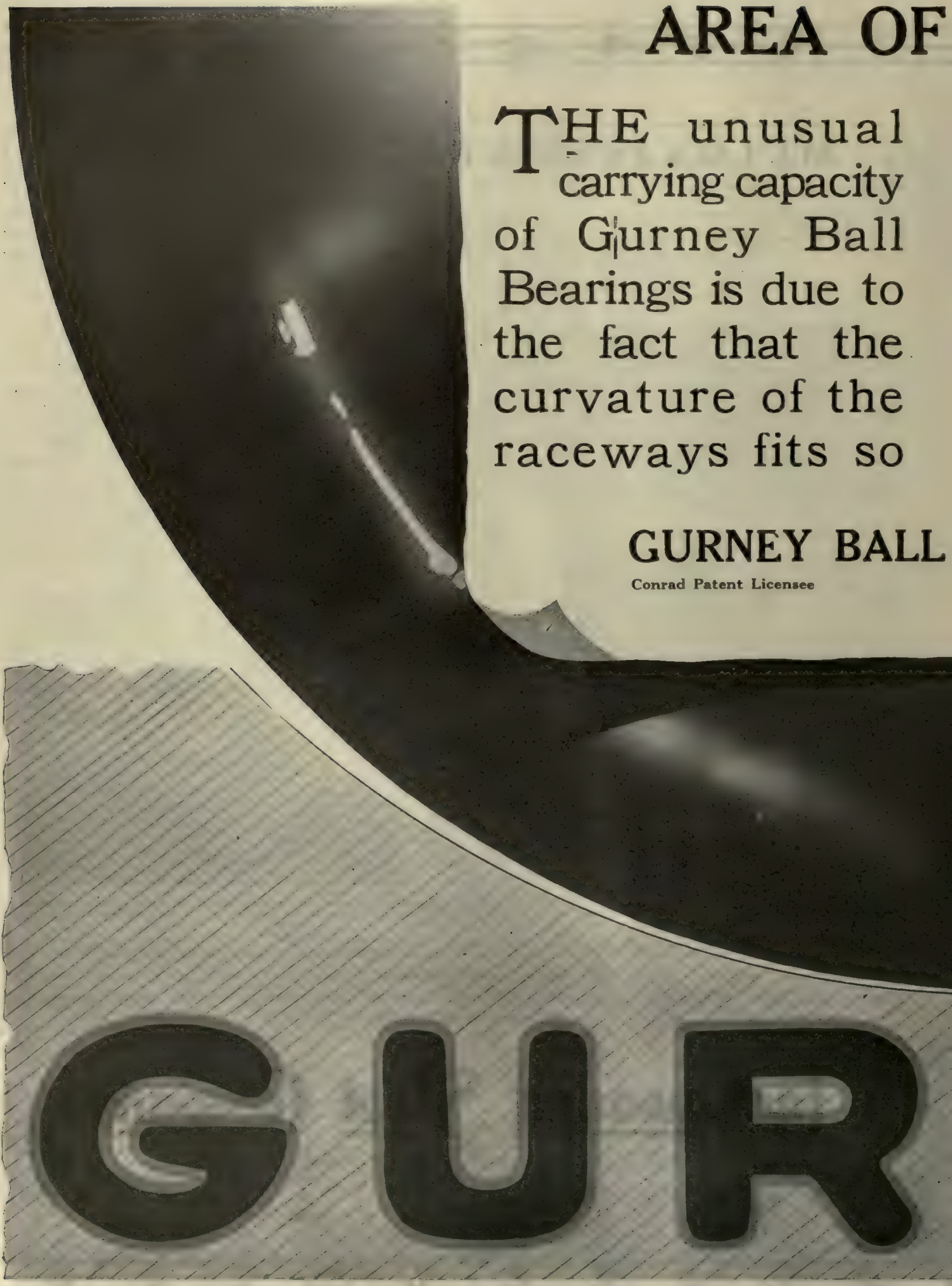
Other Lackawanna Aids to Better Track: The Lackawanna Safety-Head Angle Bar, The Lackawanna Hook-Shoulder Tie Plate, Lackawanna Track Bolts and Spikes, The Abbott Rail-Joint Plate. Write for our booklets, "Lackawanna Deseaming Process" and "Improved Track Appliances."

Lackawanna Steel Company

General Sales Office and Works: Lackawanna, N. Y.

Atlanta Boston Buffalo Chicago Cincinnati Cleveland Detroit New York Philadelphia St. Louis San Francisco

Sole Exporter of Our Commercial Products: Consolidated Steel Corporation, 165 Broadway, New York



AREA OF

THE unusual carrying capacity of Gurney Ball Bearings is due to the fact that the curvature of the raceways fits so

GURNEY BALL

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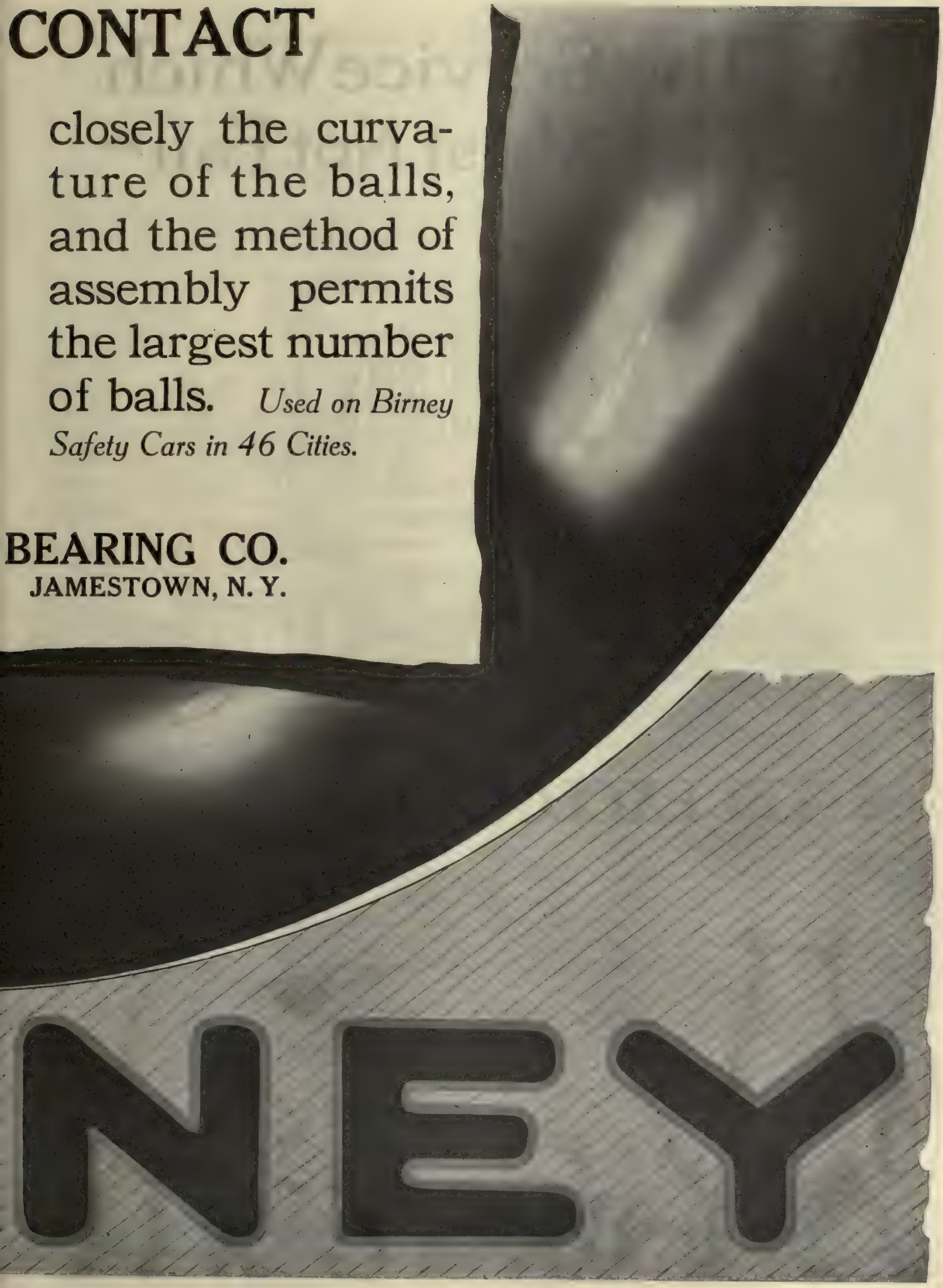
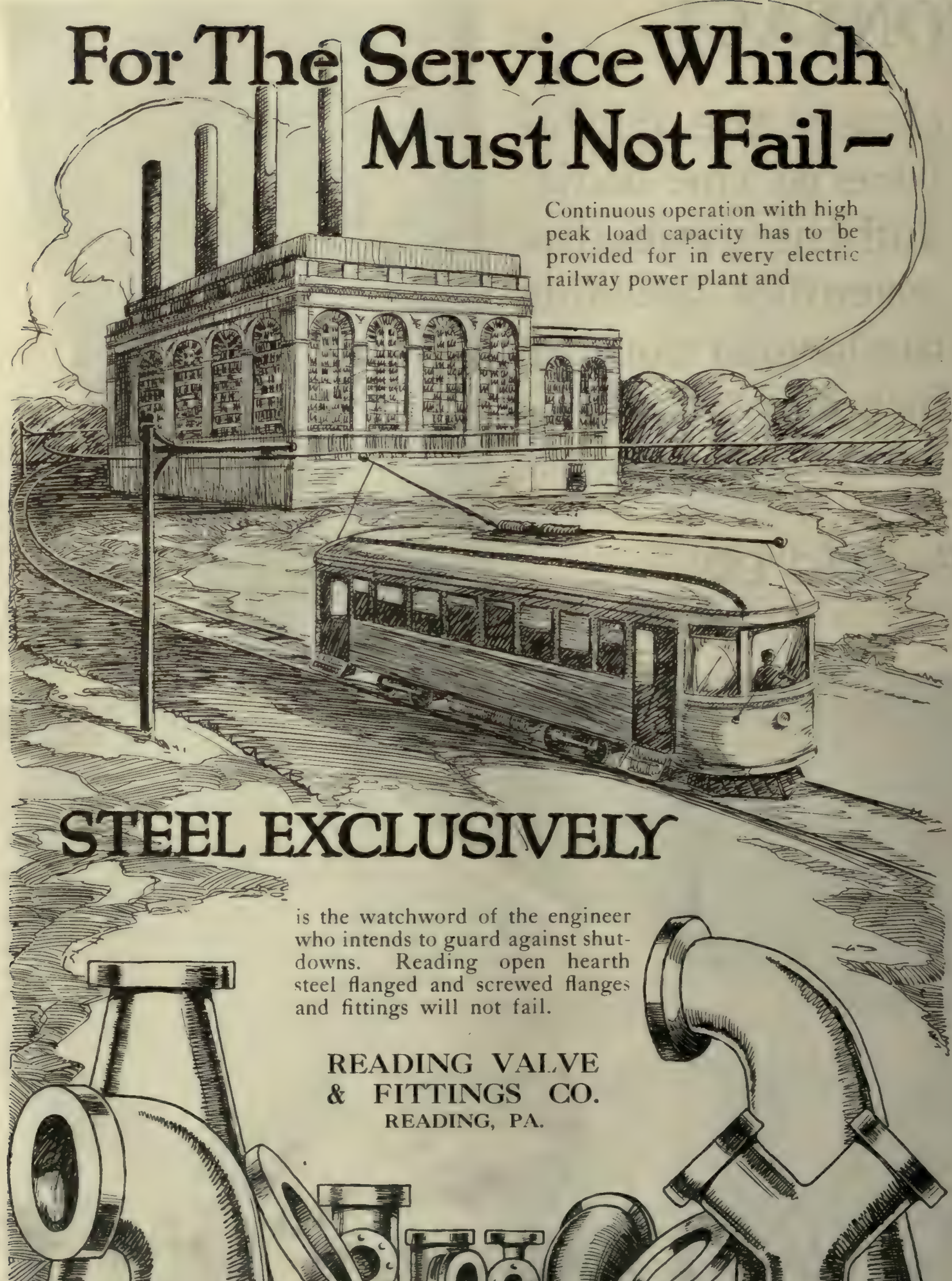
CONTACT

closely the curvature of the balls, and the method of assembly permits the largest number of balls. *Used on Birney Safety Cars in 46 Cities.*

BEARING CO.
JAMESTOWN, N. Y.





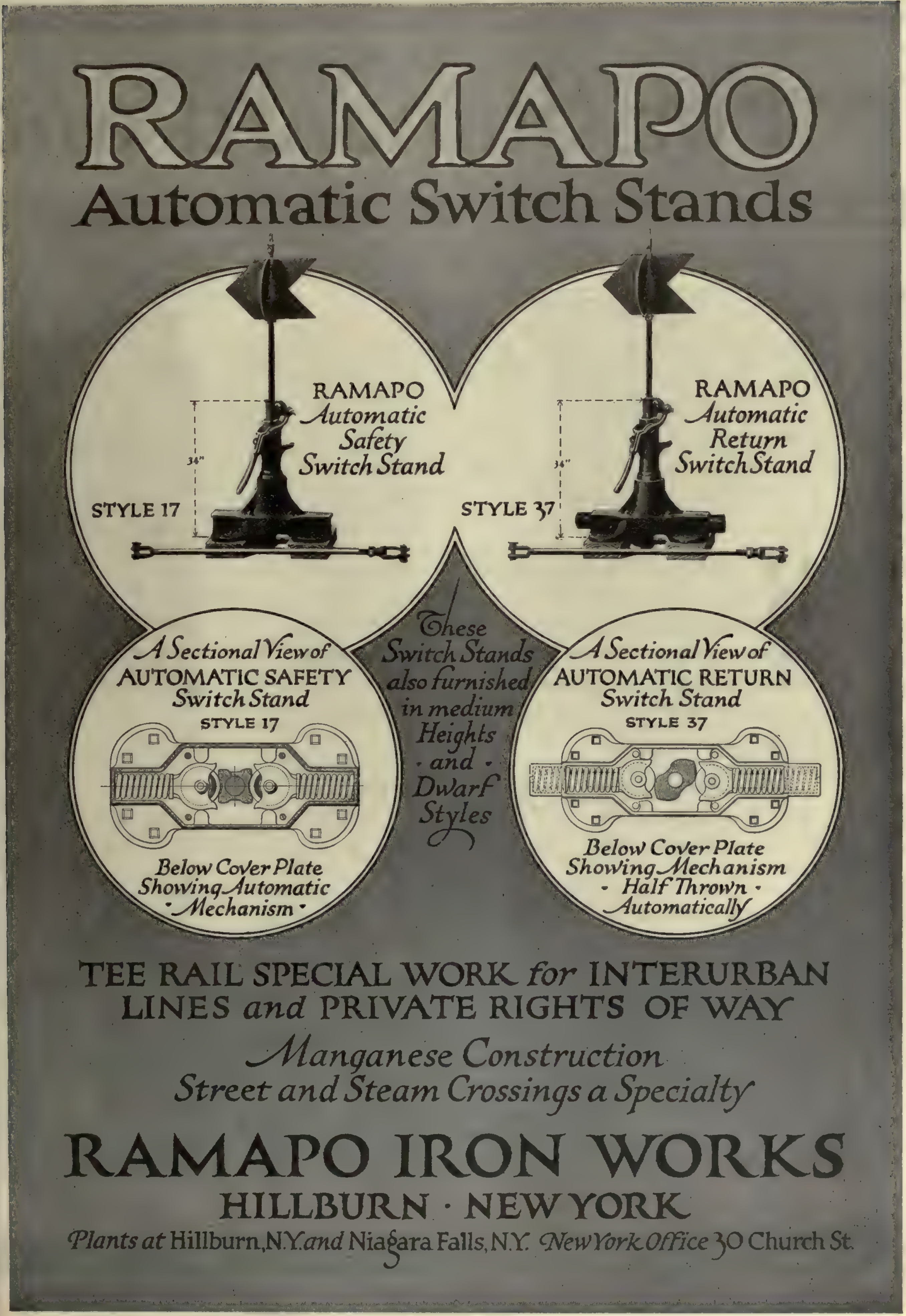
For The Service Which Must Not Fail—

Continuous operation with high peak load capacity has to be provided for in every electric railway power plant and

STEEL EXCLUSIVELY

is the watchword of the engineer who intends to guard against shut-downs. Reading open hearth steel flanged and screwed flanges and fittings will not fail.

READING VALVE
& FITTINGS CO.
READING, PA.



RAMAPO
Automatic Switch Stands

RAMAPO
Automatic Safety Switch Stand
STYLE 17

RAMAPO
Automatic Return Switch Stand
STYLE 37

A Sectional View of
AUTOMATIC SAFETY
Switch Stand
STYLE 17
Below Cover Plate Showing Automatic Mechanism

These Switch Stands also furnished in medium Heights and Dwarf Styles

A Sectional View of
AUTOMATIC RETURN
Switch Stand
STYLE 37
Below Cover Plate Showing Mechanism Half Thrown Automatically

TEE RAIL SPECIAL WORK *for* INTERURBAN LINES *and* PRIVATE RIGHTS OF WAY

Manganese Construction
Street and Steam Crossings a Specialty

RAMAPO IRON WORKS
HILLBURN · NEW YORK
Plants at Hillburn, N.Y. *and* Niagara Falls, N.Y. *New York Office* 30 Church St.

For Standard and

BUDA
ESTABLISHED
1881

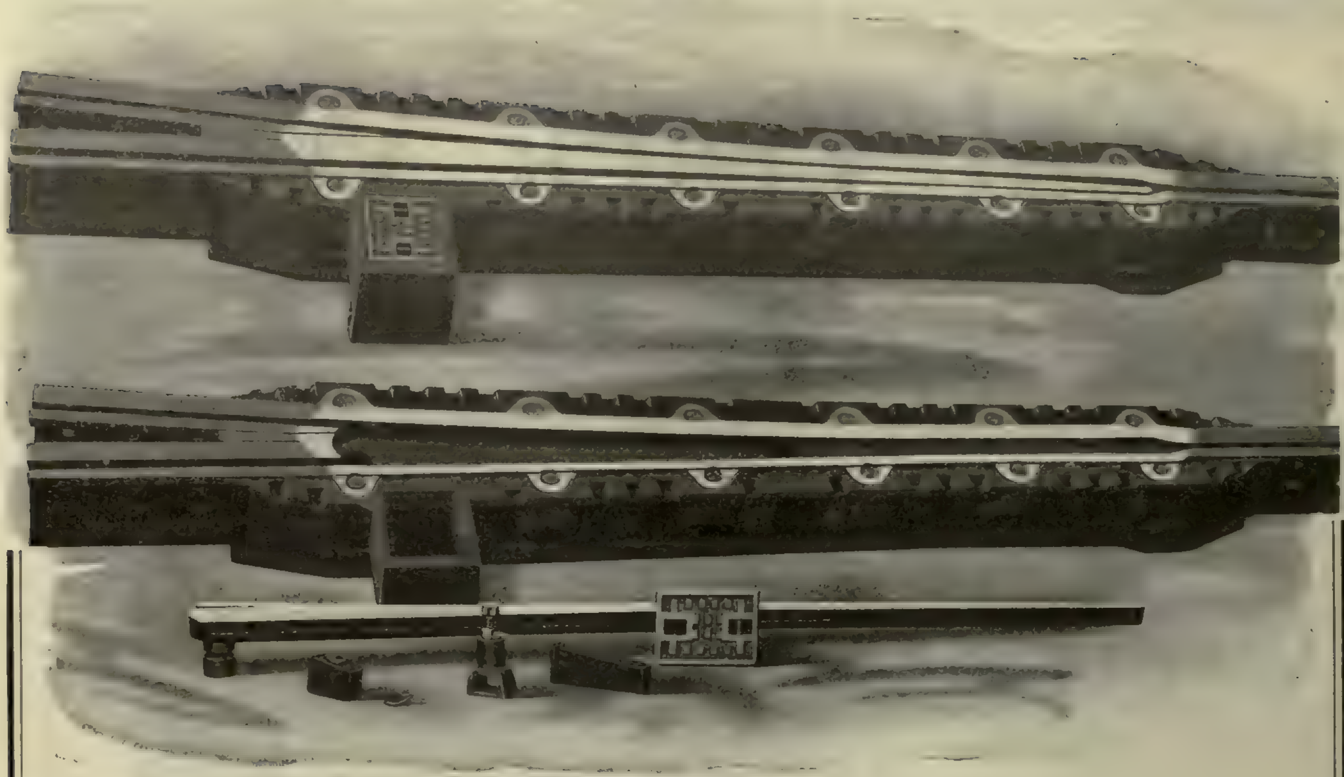
REPUTATION for satisfactory design, and service from Buda Track Work for electric railways has been built up by years of experience in all classes of work. In standard equipment, or in special complicated trackwork, the name Buda is your insurance of highest quality throughout.

Buda Special Work includes the most advanced designs of the modern types, including solid manganese and manganese center construction.

Buda centers will stay tight under any traffic and our manganese center construction will effect a marked saving in your maintenance costs.

The Buda Company
Harvey, (Chicago Suburb) Illinois

Special Track Work



Superior Switches, Mates, Frogs and Crossings

Curves, Turnouts, Cross Connections and Kerwin Portable Crossovers

Estimates Promptly Furnished

Write for Catalog

BARBOUR, STOCKWELL CO.

Established 1858

205 Broadway, Cambridge, Mass.

To all Electric Railway Men:—

The problem of cutting down lubricating costs is assuming greater importance every day. Any method of lubricating that even suggests the possibility of either lowering costs or improving service is worthy of attention. A method that guarantees *both* of these things demands immediate consideration.

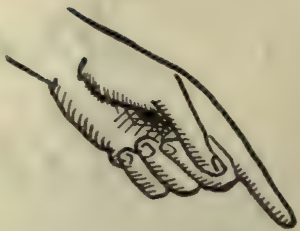
Pages two and three of this advertisement tell how TULC in a competitive test with a widely used brand of lubricating oil actually reduced lubricating costs nearly 45%.

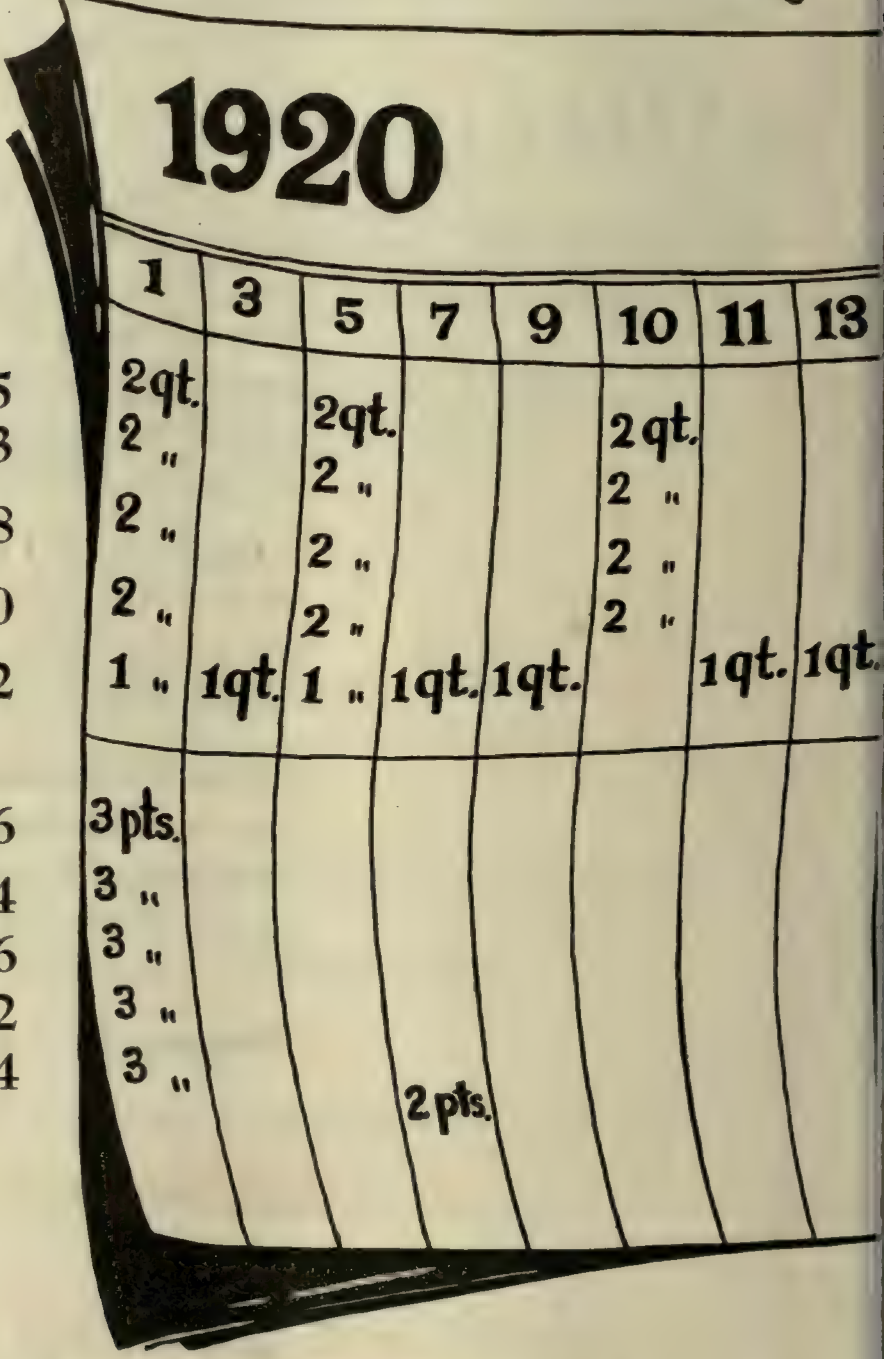
Turn to this chart. It shows at a glance just how the remarkable efficiency of Tulc becomes apparent when compared with the results obtained with other methods of lubrication.

See pages 2, 3 and 4.

TULC + Universal Service

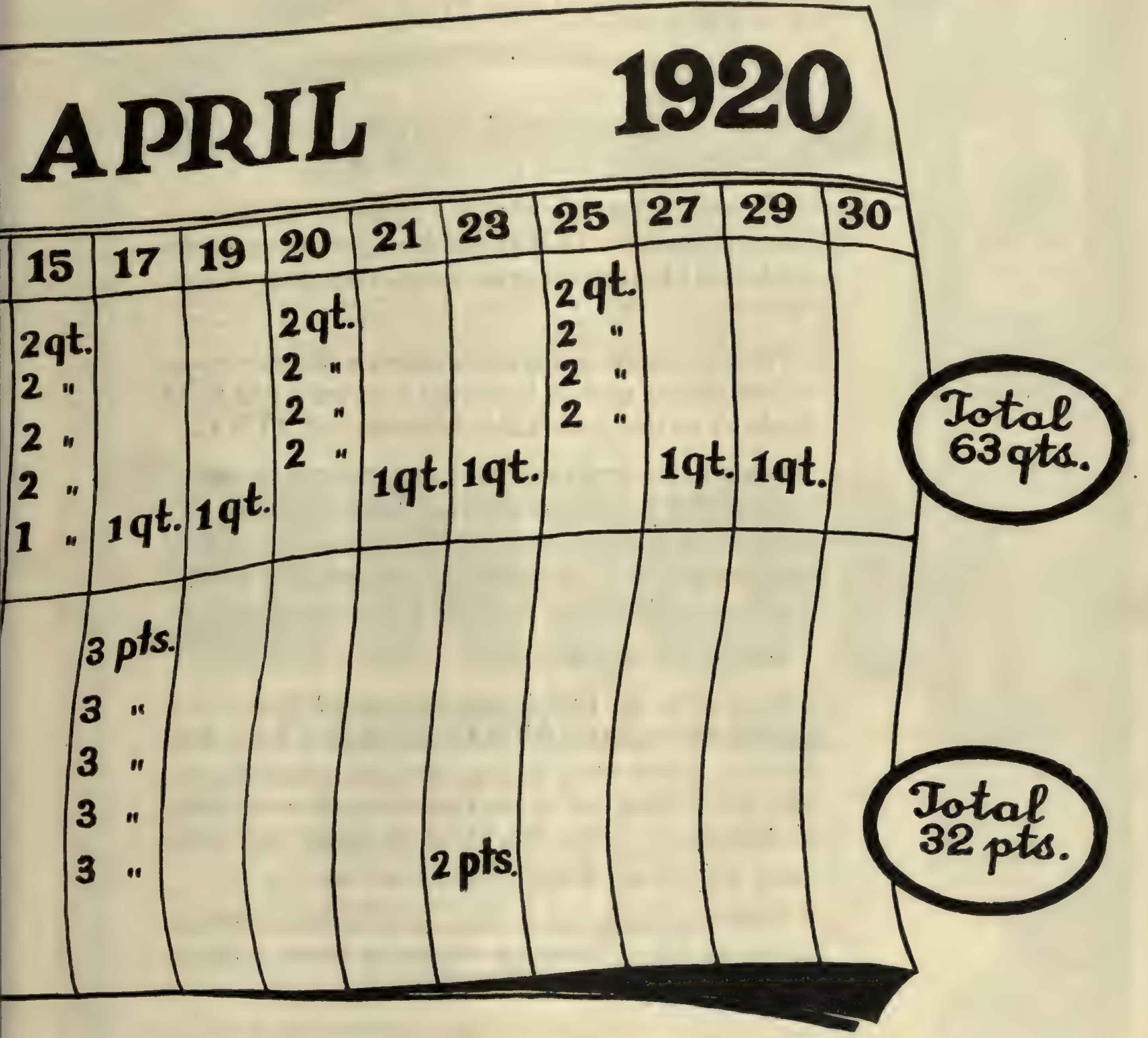
Compare results





		1	3	5	7	9	10	11	13
Oil used on these cars	No. 615	2qt.		2qt.			2qt.		
	633	2 "		2 "			2 "		
	488	2 "		2 "			2 "		
	490	2 "		2 "			2 "		
	312	1 "	1qt.	1 "	1qt.	1qt.		1qt.	1qt.
TULC used on these	No. 616	3 pts.							
	634	3 "							
	486	3 "							
	492	3 "							
	314	3 "			2 pts.				

-now compare costs



Cost of Oil on 5 cars for 30 days 63 qts. (15 gal. 3 qts.) at .27½ a gal.	$4.33
Cost of TULC on 5 cars for 30 days 32 pints (32 lbs.) at .07½ a lb.	2.40
NET SAVING: 5 Cars—30 days	$1.93

—clinching our arguments

For the past several months we've been telling you thru the pages of this paper that TULC will reduce lubricating costs on your property.

To substantiate our claims we have cited concrete examples of how TULC has brought about worth-while and often startling economies on other electric railways.

Now to clinch our arguments we make this proposition to any user of lubricant who may still be in doubt as to the remarkable efficiency of TULC.

Select a line or division of your property on which to give TULC a thorough trial. Let our service men analyze your needs, recommend a remedy for your troubles and pack your cars with the grade of TULC exactly suited to your individual requirements.

Give it a 3 months trial.

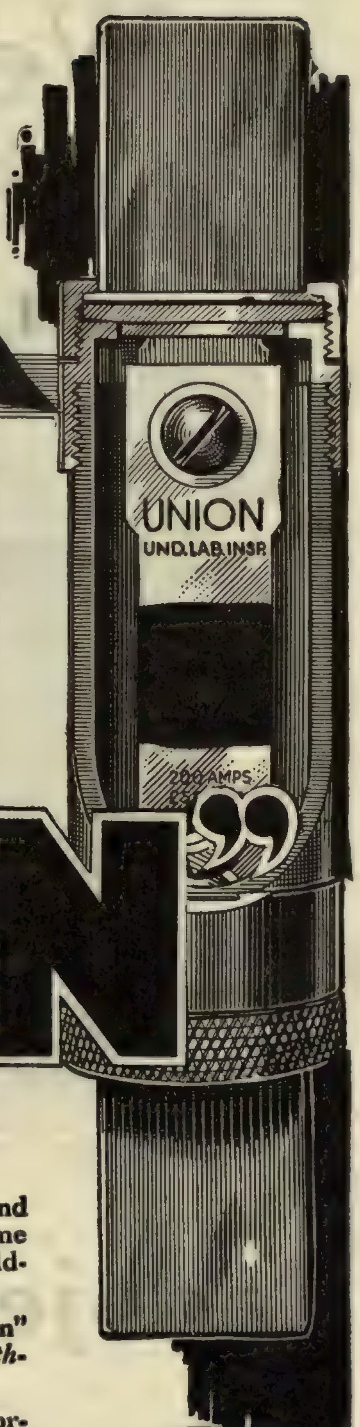
Then if at the end of that time you are not thoroughly satisfied that TULC has made a bona fide, definite, worth-while saving over the lubricant you have been using, not in the cost of a gallon of oil but in its upkeep of the machines, bearings and labor there will be no charge for our service.

Nothing can be more fair. There are no strings tied to the offer. Write or wire today and our service department will be at your disposal.

C. B. Arthur, Prest
The Universal Lubricating Co.

Cleveland, Ohio

Reinforced Like a Shotgun Shell


UNION
UND.LAB.INSR.
200 AMPS.

You would consider it ridiculous if the metal cap were placed *inside* the paper shell casing of a shotgun shell—leaving the casing alone to withstand the tremendous pressure to which it is subjected.

Yet—in many renewable fuses, the metal cap screws *inside* the casing, leaving the weakest points of the tube to withstand, as best they can, the pressure of gases when the fuse blows. This is one of the reasons why the average renewable fuse cannot withstand many heavy blowouts before the casing is rendered unfit for further service.

It's different with the

"UNION"

RENEWABLE FUSE

Heavy brass ferrules (onto which the caps screw) are riveted and screwed onto the *outside* of the tough fibre casing, serving the same purpose as the cap in the shotgun shell—reinforcing the tube and holding it firm against the pressure of the gases inside.

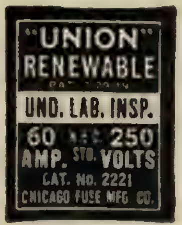
This is just one of the construction points in which the "Union" Renewable Fuse excels—just one of the points that enable it to *withstand more blowouts than any other Renewable Fuse.*

Every part of the "Union" Renewable Fuse is mechanically correct. Every part is heavy enough and strong enough to insure effective, *lasting* service.

Don't waste time and money on Renewable Fuses that will only stand a few blowouts. Use the fuse that can be renewed *indefinitely*, because of its superior construction—the "Union" Renewable Fuse.

UNION

TRADE MARK.


"UNION"
RENEWABLE
UND. LAB. INSP.
60 250
AMP. STD. VOLTS
CAT. No. 2221
CHICAGO FUSE MFG. CO.

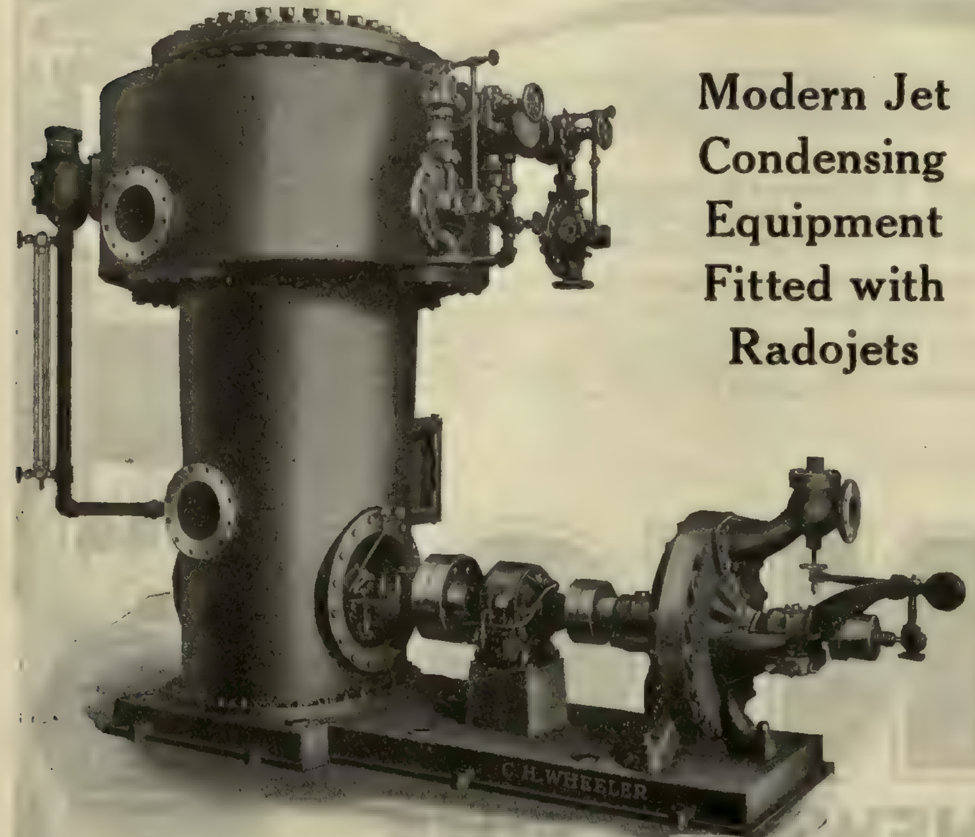
"Union" Fuses are sold by electrical dealers everywhere in the two types, Renewable and Non-Renewable.

Chicago Fuse Mfg. Co.

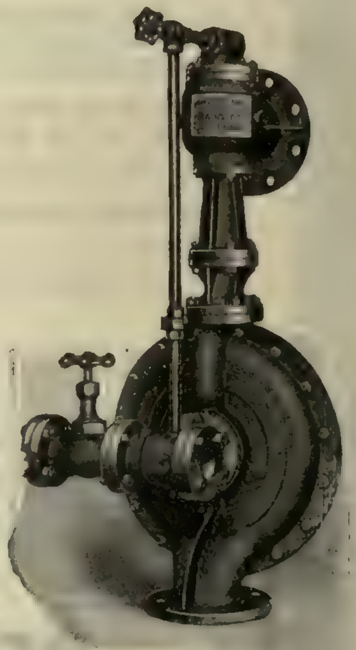
Oldest and largest manufacturers of Fuses, Electrical Protecting Materials and Conduit Fittings

Chicago New York

We Specialize in Condensing Apparatus



**Modern Jet
Condensing
Equipment
Fitted with
Radojets**



Radojet Air Pump

—one of our principal products—the

Radojet Ejector Air Pump

The high efficiency, compactness and light weight of the RADOJET has resulted in its application in equipments aggregating nearly 5,000,000 h.p.

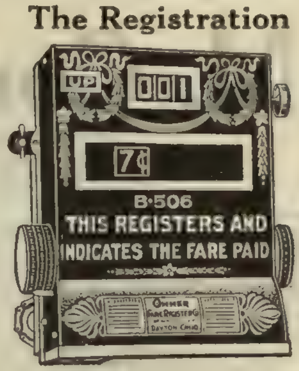
We also manufacture Surface Condensing Equipment, Forced and natural draft Cooling Towers, Exhaust Gate Valves, Multiflex Relief Valves and Expansion Joints.

C. H. Wheeler Manufacturing Co
Philadelphia, Penna.

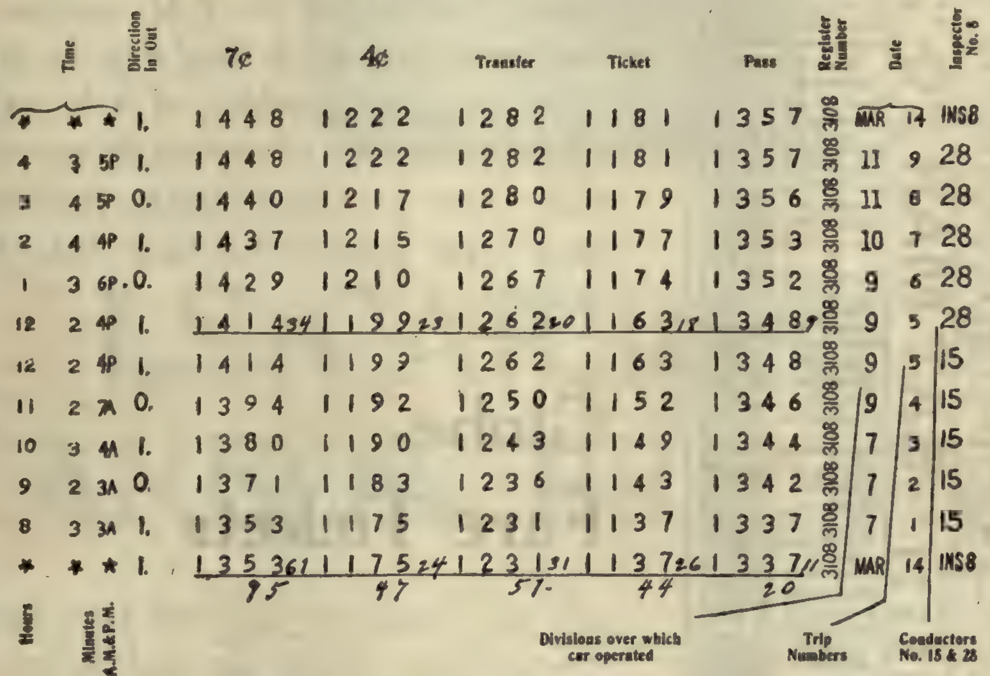
New York Boston Chicago Pittsburgh Charlotte New Orleans San Francisco Seattle

The Indication

The Registration


UP
0 0 1
7¢
B-506
THIS REGISTERS AND INDICATES THE FARE PAID
OHMER FARE REGISTER CO. DAYTON, OHIO

THE RECORD



Time			Direction In Out	7¢	4¢	Transfer	Ticket	Pass	Register Number	Date		Inspector No. 8
*	*	★	I.	1448	1222	1282	1181	1357	3108	MAR	14	INS8
4	3	5P	I.	1448	1222	1282	1181	1357	3108	11	9	28
3	4	5P	O.	1440	1217	1280	1179	1356	3108	11	8	28
2	4	4P	I.	1437	1215	1270	1177	1353	3108	10	7	28
1	3	6P	O.	1429	1210	1267	1174	1352	3108	9	6	28
12	2	4P	I.	1414 34	1199 23	1262 20	1163 18	1348 9	3108	9	5	28
12	2	4P	I.	1414	1199	1262	1163	1348	3108	9	5	15
11	2	7A	O.	1394	1192	1250	1152	1346	3108	9	4	15
10	3	4A	I.	1380	1190	1243	1149	1344	3108	7	3	15
9	2	3A	O.	1371	1183	1236	1143	1342	3108	7	2	15
8	3	3A	I.	1353	1175	1231	1137	1337	3108	7	1	15
*	*	★	I.	1353 61	1175 24	1231 31	1137 26	1337 11	3108	MAR	14	INS8
				95	47	51-	44	20				
Hours	Minutes A.M.&P.M.											

Divisions over which car operated

Trip Numbers

Conductors No. 15 & 28

Every merchant insists that sales shall be recorded, classified, identified as to the salesman, and the amount paid clearly indicated to the purchaser.

Your conductors sell transportation to a public trained along these lines, and you can best safeguard your fares by utilizing this classifying, recording and indicating principle in your own business by means of the Ohmer System.

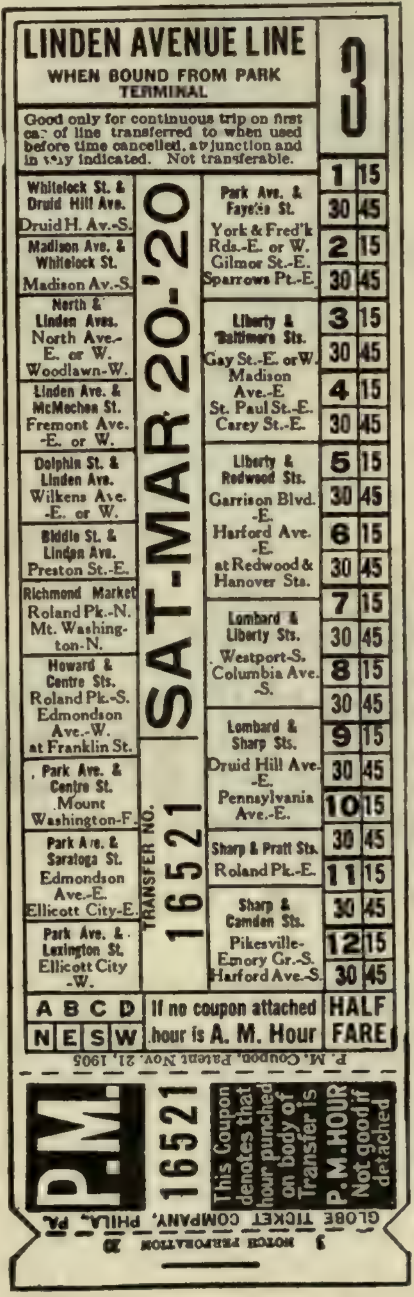
The Ohmer System is quick and accurate, both as to fare collecting and fare accounting. It is adapted to all kinds of service. Through its fairness and businesslike simplicity it appeals to the best class of conductors, and through the operation of the quickly compiled Ohmer System statistics, you are enabled to secure increasingly better standards of service from your men.

The Ohmer System can be applied to your property without tying up any of your capital. We bear the investment burden. Our contracts are sufficiently flexible to take care of changing conditions, increased fare rates, etc., and you need never fear being caught with a lot of obsolete devices on your hands.

Ohmer Fare Register Company

Dayton, Ohio

P. M. Coupon Transfers



LINDEN AVENUE LINE
WHEN BOUND FROM PARK
TERMINAL

3

Good only for continuous trip on first car of line transferred to when used before time cancelled, at junction and in way indicated. Not transferable.

Whitelock St. & Druid Hill Ave.
Druid H. Av.-S.
Madison Ave. & Whitelock St.
Madison Av.-S.
North & Linden Aves.
North Ave.-E. or W.
Woodlawn-W.
Linden Ave. & McMechen St.
Fremont Ave. -E. or W.
Dolphin St. & Linden Ave.
Wilkens Ave. -E. or W.
Biddle St. & Linden Ave.
Preston St.-E.
Richmond Market
Roland Pk.-N.
Mt. Washington-N.
Howard & Centre Sts.
Roland Pk.-S.
Edmondson Ave.-W.
at Franklin St.
Park Ave. & Centre St.
Mount Washington-F.
Park Ave. & Saratoga St.
Edmondson Ave.-E.
Ellicott City-E.
Park Ave. & Lexington St.
Ellicott City -W.

SAT-MAR 20-'20

TRANSFER NO. 16521

Park Ave. & Fayette St.
York & Fred'k Rds.-E. or W.
Gilmor St.-E.
Sparrows Pt.-E.
Liberty & Baltimore Sts.
Gay St.-E. or W.
Madison Ave.-E
St. Paul St.-E.
Carey St.-E.
Liberty & Redwood Sts.
Garrison Blvd. -E.
Harford Ave. -E.
at Redwood & Hanover Sts.
Lombard & Liberty Sts.
Westport-S.
Columbia Ave. -S.
Lombard & Sharp Sts.
Druid Hill Ave. -E.
Pennsylvania Ave.-E.
Sharp & Pratt Sts.
Roland Pk.-E.
Sharp & Camden Sts.
Pikesville-Emory Gr.-S.
Harford Ave.-S.

1	15
30	45
2	15
30	45
3	15
30	45
4	15
30	45
5	15
30	45
6	15
30	45
7	15
30	45
8	15
30	45
9	15
30	45
10	15
30	45
11	15
30	45
12	15
30	45

A B C D
N E S W

If no coupon attached hour is A. M. Hour

HALF FARE

P. M. Coupon, Patent Nov. 21, 1905

P.M.

16521

This Coupon denotes that hour punched on body of Transfer is P.M. HOUR Not good if detached

GLOBE TICKET COMPANY, PHILA., PA.

NOTCH PERFORATION

There are millions of P.M. Coupon transfers used every day in all sections of the country under all operating conditions.

There is no other transfer that gives such instantaneous action, such protection from transfer abuse—as the P.M. coupon. On one man cars, much time may be saved—for there is no punching of A.M. or P.M. time—the coupon eliminates the necessity of that. They have been used continuously by some large systems for more than fifteen years.

Globe Fare Tickets

are the answer to the odd fare problem. These handy tickets are sold in book and strip form—like a commuters ticket—and may be torn off as used. No bother with odd change—consequently a saving of time.

Globe paper fare tickets will help collect the odd fares faster than were ever rung up.

Shall we send you samples?

GLOBE TICKET COMPANY

112-114 NORTH 12TH STREET
PHILADELPHIA, PA.

LE CARBONE CARBON BRUSHES

They are uniform in quality

"They talk for themselves."

W. J. JEANDRON
227 Fulton St., New York City
PITTSBURGH OFFICE: 634 Wabash Bldg.
Canadian Distributors:
Lyman Tube & Supply Co., Ltd., Montreal and Toronto

Shanklin Transfer Issuing Machine

A New Factor in Efficient Railroading

Particularly Valuable on One-Man and Pay-as-you-enter Cars

Quicker Schedules Possible.

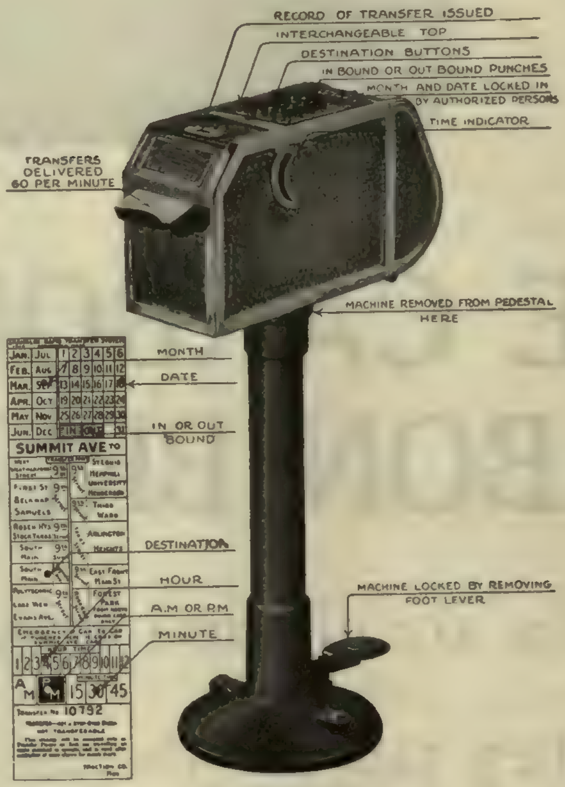
Platform operations speeded up.

Transfers issued 60 per minute if necessary.

Delays due to cost in loading passengers are reduced to a minimum. Lightens conductor's work, increases his efficiency.

Conductor or operator has both hands free for the operation of car or collection of fares.

Passenger secures transfer at the time of payment of fare without delay.


RECORD OF TRANSFER ISSUED
INTERCHANGEABLE TOP
DESTINATION BUTTONS
IN BOUND OR OUT BOUND PUNCHES
MONTH AND DATE LOCKED IN BY AUTHORIZED PERSONS
TIME INDICATOR
TRANSFERS DELIVERED 60 PER MINUTE
MACHINE REMOVED FROM PEDESTAL HERE
MONTH
DATE
IN OR OUT BOUND
DESTINATION
HOUR
A.M OR P.M
MINUTE
MACHINE LOCKED BY REMOVING FOOT LEVER
JAN. JUL. FEB. AUG. MAR. SEP. APR. OCT. MAY NOV. JUN. DEC.
IN OUT
SUMMIT AVE TO
A M P M 15 30 45
10792

Each transfer issued is recorded.

Where transfers are paid for, there is a positive check on each one issued.

By the use of Transfer Machines, transfers are under the control of the auditing department.

Saving in paper is also effected with this system, as there is absolutely no waste of printed transfers; each transfer is used. The saving over the daily dated transfer now used is estimated to save over 40 per cent of printing.

Each transfer issued is punched with month, date, destination, minute and hour time, A.M. or P.M., also in or outbound.

The claims made for the Transfer Machine are not exaggerated. They are simple statements of results secured during operating test.

Submit your transfer on some particular line that you would prefer a trial.

Shanklin Equipment Company, Inc.

Besse System Building
Springfield, Mass.

We regret our inability to exhibit our machines at the Convention this year, because of our force being rushed with installations and they could not be spared for the Convention.

U. S. G. Brush Quality Is Constant

It is of the utmost importance that uniformity of quality be rigidly maintained in order that the operator, after definitely determining the grade of brush best suited to his needs, may secure the **same identical quality on future orders by simply specifying the grade number.**

By owning and operating our own Mexican Mines we control the source of supply for the graphite, thus giving us control of one of the principal products entering into the composition of U.S.G. brushes. This particular graphite being of an extremely soft nature can be ground to an unusual degree of fineness, and thereby acts as a self lubricant, preserving instead of wearing the commutator bars.

U.S.G. brushes insure service and quality that you can depend upon in the operation of your motor and Central Station units.

Let us figure on your requirements

Look for our exhibit at the Convention

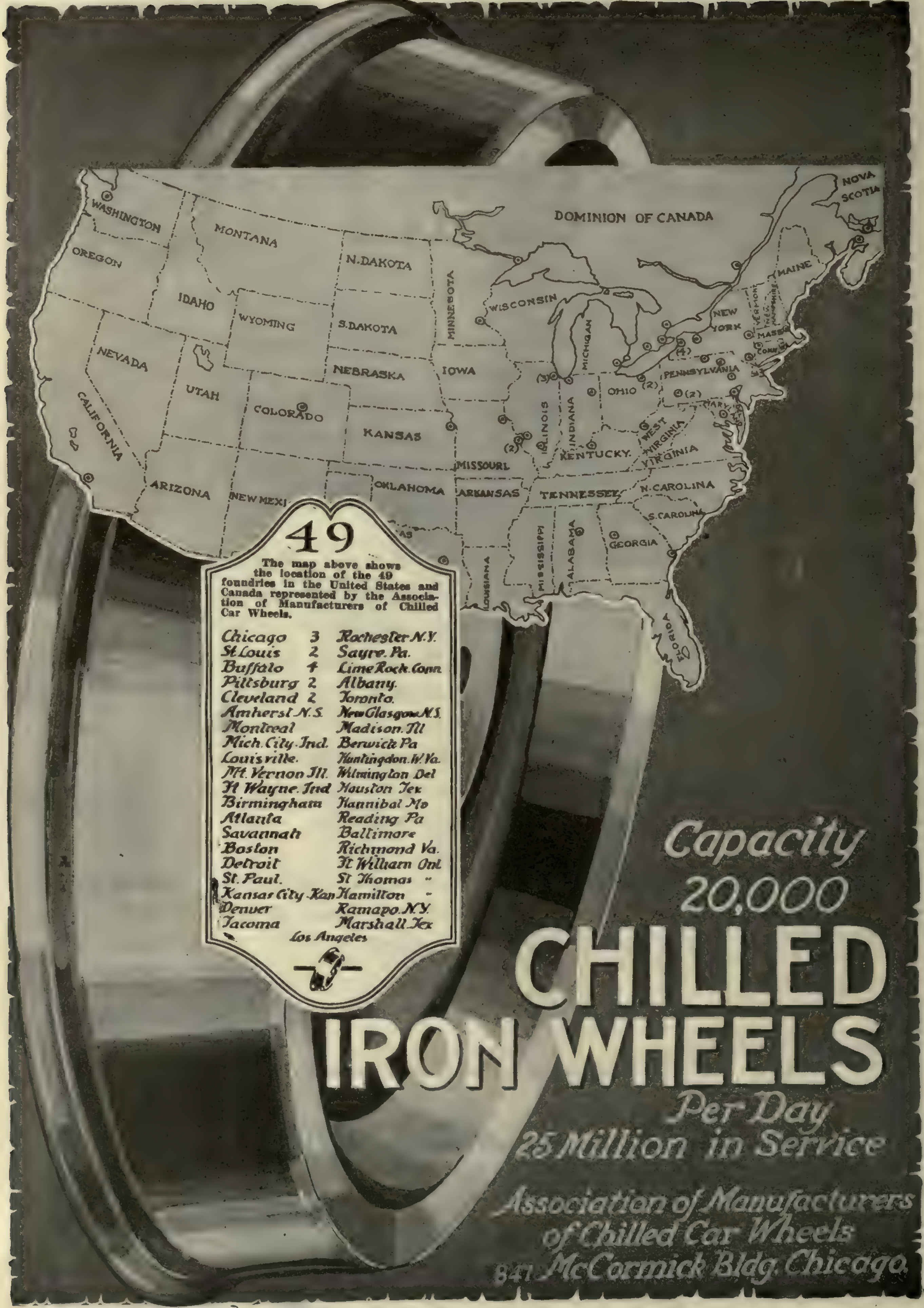
THE UNITED STATES GRAPHITE COMPANY

SAGINAW, MICH., U. S. A.

Branch Offices:

New York
Chicago
Philadelphia
St. Louis
Pittsburgh
Denver
Birmingham
San Francisco

Largest Miners of Graphite on This Continent



49

The map above shows the location of the 49 foundries in the United States and Canada represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago	3	Rochester N.Y.
St Louis	2	Sayre. Pa.
Buffalo	4	Lime Rock. Conn
Pittsburg	2	Albany.
Cleveland	2	Toronto.
Amherst N.S.		New Glasgow N.S.
Montreal		Madison. Ill
Mich. City-Ind.		Berwick Pa
Louisville.		Huntingdon. W. Va.
Mt. Vernon Ill.		Wilmington Del
Ft Wayne. Ind		Houston Tex
Birmingham		Hannibal Mo
Atlanta		Reading Pa
Savannah		Baltimore
Boston		Richmond Va.
Detroit		Ft William Ont
St. Paul.		St Thomas "
Kansas City Kan		Hamilton "
Denver		Ramapo. N.Y.
Tacoma		Marshall Tex

Los Angeles

Capacity
20,000
CHILLED
IRON WHEELS
Per Day
25 Million in Service

Association of Manufacturers
of Chilled Car Wheels
841 McCormick Bldg. Chicago.

Samson
Spot Trolley Cord
Waterproofed

can be distinguished at a glance by our trade mark, the Colored Spots. Stands the wear because it is made of extra quality stock, smoothly finished. Resists the action of the weather because it is firmly braided and thoroughly waterproofed.

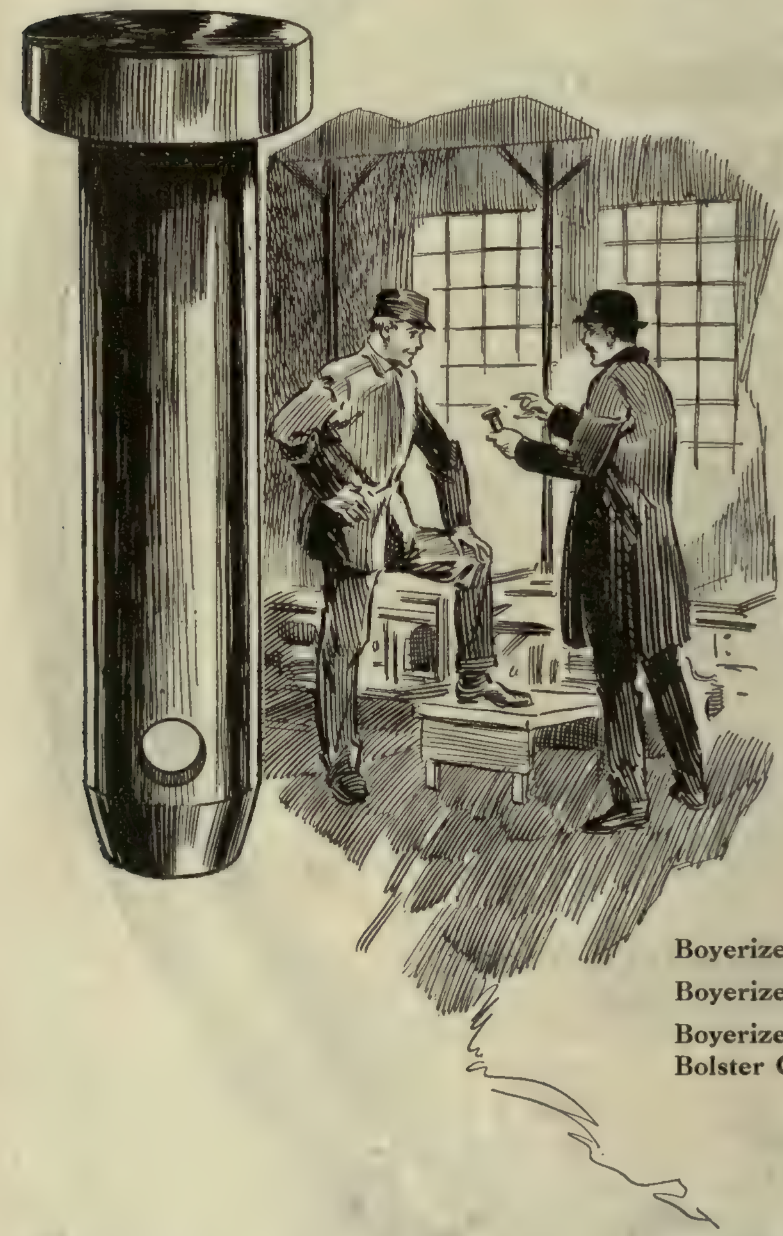
Samson Bell and Register Cord

All sizes and colors, with wire centre, if desired. Resists abrasion far longer than common rough cord. More durable and economical than any other material. Samples and prices gladly sent.

Samson Cordage Works
Boston, Mass.

Boyerize

FOR ECONOMY
IN EVERY KIND OF ELEC



No, we aren't going to ask you to sit down with a slide rule and figure out how many thousandths of a cent per car-mile you can save by buying Boyerized Brake Pins, Bushings and other long-wear specialties because of superior mileage.

But we'll just ask you to look over those brake-rigging pull-ins that kept your $10,000 to $20,000 cars from *earning* say $60 on the road for each day they were a cause of *expense* in the *shop*.

Because somebody fell for a little deceitful economy in the first cost of one of the cheapest things you can buy; even when you buy the best!

Other Boyerized

Boyerized Brake Hangers

Boyerized Brake Lever Pins and Bushings

Boyerized Wearing Plates between the Bolster and Bolster Carrier

Bemis Car Truck Co.,

Boyerize

FOR SAFETY

TRIC RAILWAY SERVICE

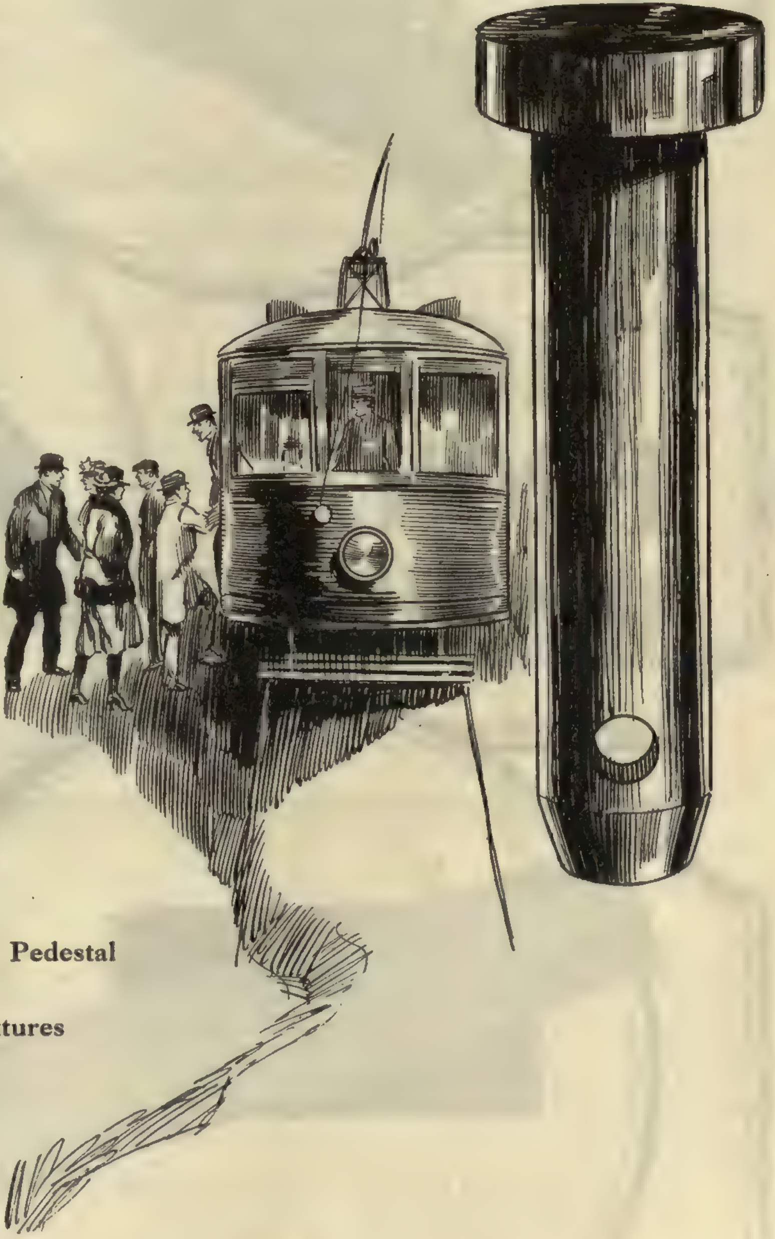
But if Boyerized Brake Pins and Bushings did not save you a penny they would still be justified on the paramount score of Safety, whether in interurban rapid transit or city service.

Ordinary brake-rigging fittings start out in life with good intentions, but their behavior is as uncertain as their composition.

You never know when such pins will shear and make the brakes ineffective within the usual, *expected* zone of braking safety.

Boyerized Brake Pins are different. They are not merely hardened to secure longer wear, but are hardened *uniformly* so that no treacherous unexpected flaw can develop to cause accident.

To *Boyerize* means



Specialties Are:

Boyerized Wearing Plates between the Pedestal Straps and the Journal Box

Boyerized Pins and Bushings for door fixtures

Springfield, Mass.

VK
"TIGER BRONZE BEARINGS"
MORE-JONES B. & M. CO'S ST. LOUIS MO.
ARMATURE
MJ

MORE-JONES

Perfect lubrication plus maximum conductivity. That's the combination that makes V-K Oilless Trolley Wheels lowest in ultimate cost and highest in net efficiency. Examine the construction of a V-K Wheel and you'll see why. Notice that it's properly balanced and mechanically perfect in finish. The metal from which it is made is especially tough, yet not too hard. This means greater mileage and at the same time least detriment to overhead construction. The patented oilless graphite and bronze gauze bushing is non-insulating, heat proof, long lived and easily interchangeable.

The V-K Trolley Wheel used with the V-K Non-Arcing Harp has proven it will do more to reduce trolley maintenance costs, both wheel replacements and overhead repairs, than any other current collector on the market today.

Write for Trolley Wheel Catalogue

The hundreds of Electric Railways that have standardized on More-Jones "Tiger" Bronze Axle and Armature Bearings have found they are by far most economical. The money they save in bearing replacements and in the rewinding of armature coils pays for "Tiger" Bronze Bearings many times over in the course of a year. And besides, there's the additional revenue derived by keeping the cars in constant service. The exceptional toughness and anti-frictional qualities of "Tiger" Bronze insures great strength and a very slow and even rate of wear. This, in turn, means correct bearing alignment and much greater mileage.

Write for Illustrated Bulletin.

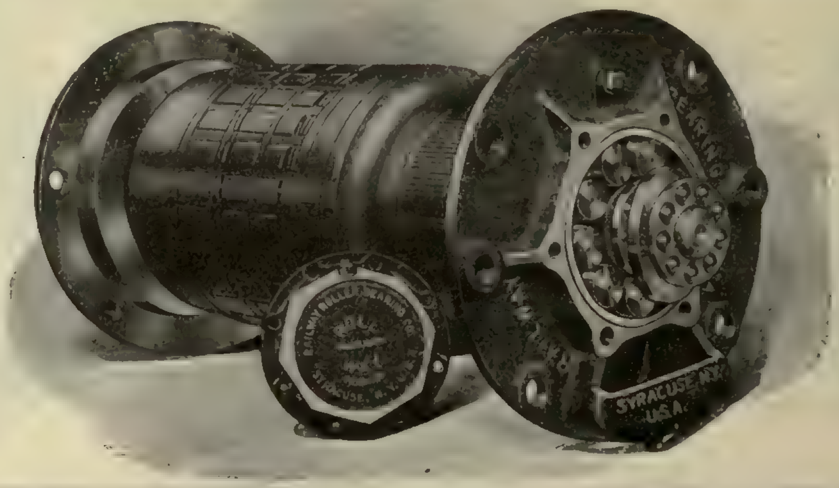
Here is a babbitt developed only after years of chemical and metallurgical research. Few metals have so emphatically demonstrated the difference between ordinary and specialized products as has M-J Armature Babbitt. The peculiar conditions of the electric railway armature bearing field as to temperature, strain, vibration, and pounding were but poorly met by ordinary babbitts. So More-Jones experts, with more than 40 years' experience to guide them, compounded an exceptional Babbitt of tin, copper, antimony and metallic nickel—*no lead*—especially for that service.

Service—not first cost is the basis upon which M-J Armature Babbitt is manufactured and sold.

Write for "The Babbitt Booklet"

BRASS & METAL CO., St. Louis, Mo.

Power Saved by the use of



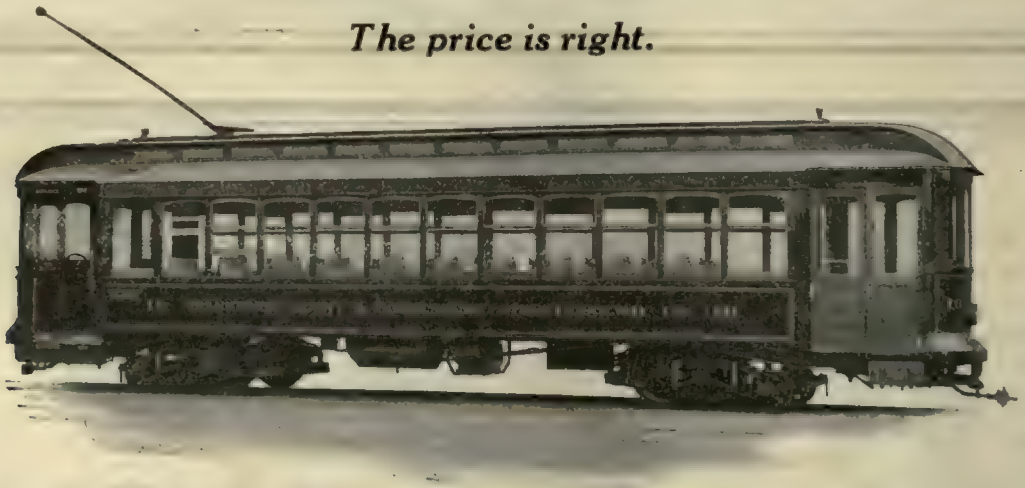
ROLLWAY BEARINGS

enables the chief engineer to cut down on his coal requirements at a time when this very thing is an absolute necessity. In a typical instance, a saving of 9 per cent in running time with a decrease of energy consumed of more than 10 per cent was made possible by the installation of Rollway Bearings. In addition, they are practically frictionless and require lubrication not oftener than four times a year, thus showing an unprecedented saving in maintenance costs for labor alone.

They can be adapted to all existing trucks and axles including those of the safety car and require no adjustments in assembly.

Service records on city suburban and interurban lines are yours for the asking.

The price is right.



The Railway Roller Bearing Co.

Syracuse, N. Y.

Adaptability
Universal Use
Uniform Performance

The S-W Brake Slack Adjuster will fit your trucks or any other trucks in use anywhere. It is the one practical adjuster that meets all conditions.

Hundreds of cars, of every type, from Atlantic to Pacific are equipped with S-W Slack Adjusters. This is not the result of super-salesmanship. It's the result of super-satisfaction.

And they always make good

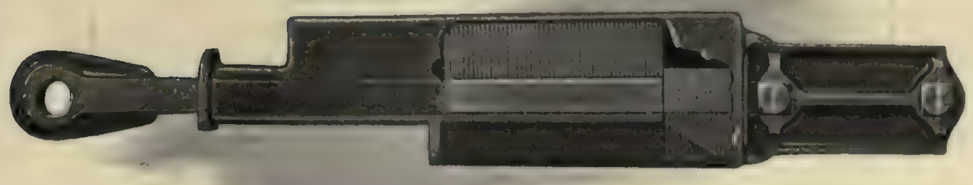
From a safety standpoint because they operate at 100% efficiency, eliminating the human element and all possibility of brake failure.

From an economy standpoint because they save inspection labor, increase brake shoe mileage, and eliminate flat wheels and flange troubles.

What they do for others they'll do for you.

TRY THEM!

Smith-Ward Brake Co.
Bush Terminal Bldg. No. 1
233 Thirty-Seventh St., Brooklyn, N. Y.

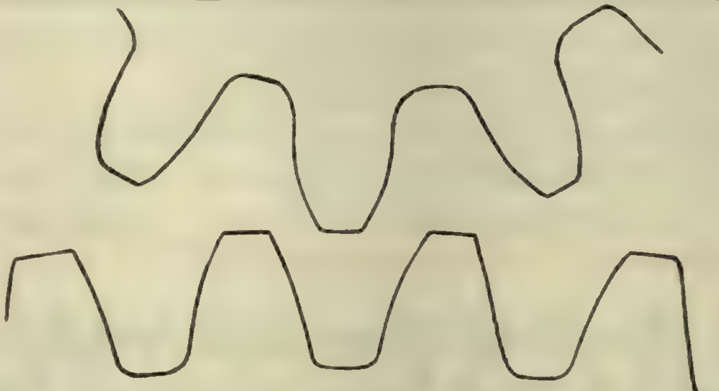


S-W Brake Slack Adjusters
Make Good!

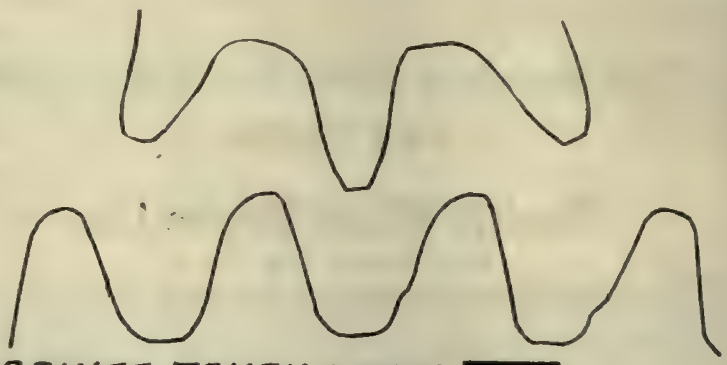
India

"Tool Steel" gears

Every—



RUBBINGS TAKEN FROM TOOL STEEL
GEAR WHEEL AND PINION
MOTOR CAR NO. 67.
TAKEN ON 7-2-19.
MILEAGE 73,637.



RUBBINGS TAKEN FROM [redacted]
GEAR WHEEL AND PINION
MOTOR CAR NO. 67.
TAKEN ON 7-2-19.
MILEAGE 73,637.

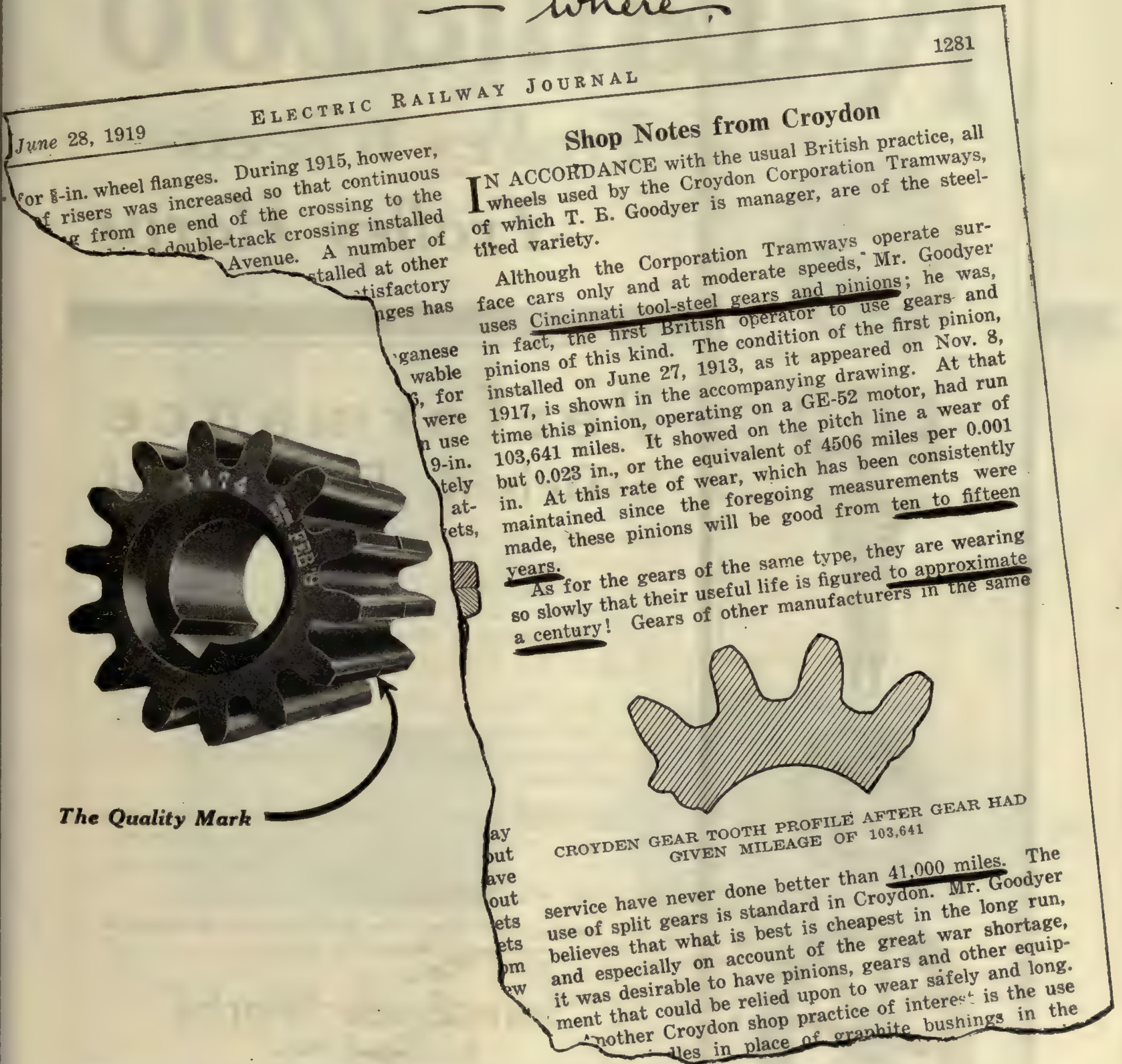
Once a test—

The Tool Steel Gear &

England

and pinions

— where,



June 28, 1919 ELECTRIC RAILWAY JOURNAL 1281

for ⅝-in. wheel flanges. During 1915, however,
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Shop Notes from Croydon

IN ACCORDANCE with the usual British practice, all wheels used by the Croydon Corporation Tramways, of which T. E. Goodyer is manager, are of the steel-tired variety.

Although the Corporation Tramways operate surface cars only and at moderate speeds, Mr. Goodyer uses Cincinnati tool-steel gears and pinions; he was, in fact, the first British operator to use gears and pinions of this kind. The condition of the first pinion, installed on June 27, 1913, as it appeared on Nov. 8, 1917, is shown in the accompanying drawing. At that time this pinion, operating on a GE-52 motor, had run 103,641 miles. It showed on the pitch line a wear of but 0.023 in., or the equivalent of 4506 miles per 0.001 in. At this rate of wear, which has been consistently maintained since the foregoing measurements were made, these pinions will be good from ten to fifteen years.

As for the gears of the same type, they are wearing so slowly that their useful life is figured to approximate a century! Gears of other manufacturers in the same service have never done better than 41,000 miles. The use of split gears is standard in Croydon. Mr. Goodyer believes that what is best is cheapest in the long run, and especially on account of the great war shortage, it was desirable to have pinions, gears and other equipment that could be relied upon to wear safely and long.

CROYDEN GEAR TOOTH PROFILE AFTER GEAR HAD GIVEN MILEAGE OF 103,641

Another Croydon shop practice of interest is the use
lles in place of graphite bushings in the

The Quality Mark

— always a customer.

Pinion Co., Cincinnati, Ohio

Kalamazoo

Trolley Wheels—
Trolley Harps

Performance
Efficient, Economical

The ability to "stand up" under the most gruelling conditions and the ability to perform efficiently and economically are characteristics of Kalamazoo Equipment. Long life without injury to the wire has been proved in 20 years service on the leading roads of this country.

The long life of Kalamazoo Wheels is due to the material from which they are made—new, pure Lake copper—and careful, scientific methods of manufacture.

Kalamazoo Harps are correctly built to give perfect and continuous contact. To remove the wheel, simply take out one cotter pin—a big time saving in renewals.

Our catalog fully describes the complete Kalamazoo line. Write for a copy.

Star Brass Works
Kalamazoo, Mich.

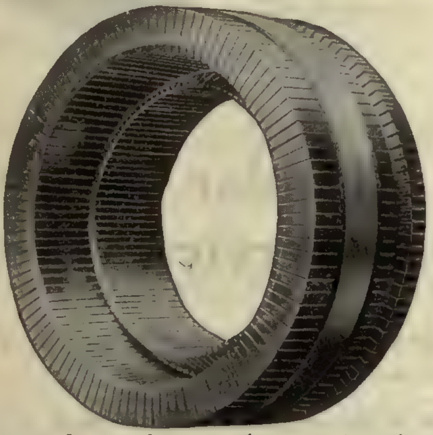
The largest exclusive manufacturers of trolley wheels in the world.

"CAMERON"

National Headquarters for ARMATURE PARTS

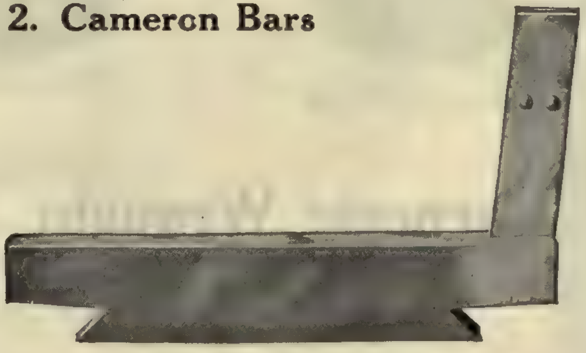
Quality—Quantity—Rapid Delivery—Dependable Service

1. Cameron Commutators



Highest grade metal, correctly wound against overload. They minimize generator or motor trouble.

2. Cameron Bars



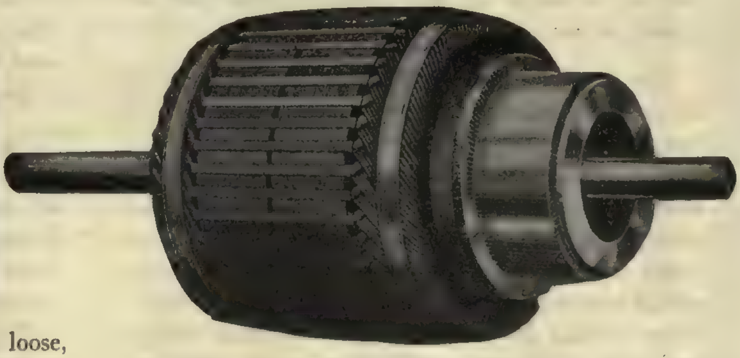
of pure hard-drawn copper only—not the drop forged kind. Results in unusually high conductivity.

Inserted lugs can be obtained, completely ready for armature lead connections. Save labor and trouble.

3. Cameron Coils

Guaranteed to be right. Bars cannot come loose, brushes will not arc—because joined under hydraulic pressure.

4. Cameron Mica



Will reduce your truing cost because made entirely of "Canadian amber"—the best for the purpose because softest.

"Cheapest in the Long Run"

Send for catalog and prices

Cameron Electrical Mfg. Co., Inc.

Ansonia, Conn., U. S. A.

Steel for Service

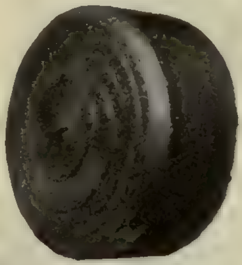


Fig. 1. Solid Disk from which sections are made

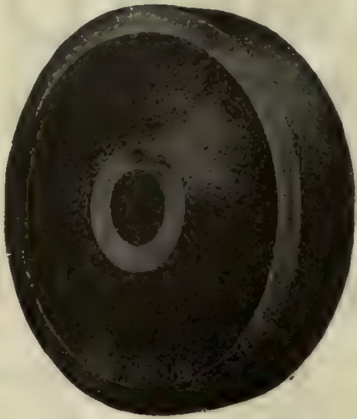


Fig. 2. Steel Gear Blank

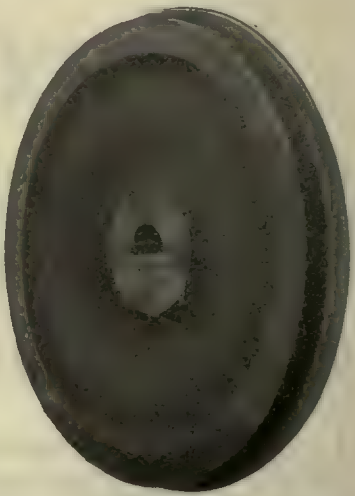


Fig. 3. Standard Electric Railway Wheel

Carnegie Wrought Steel Circular Sections for Electric Railway Service

ROLLING stock must be the best in order to withstand the shock and strain of electric railway service. Wheels and gears must be designed to meet these demands.

Carnegie Steel Company is especially well equipped to supply your needs. Its solid wrought steel gear blanks and wheels are well known to railway officials as the most reliable for all classes of service.

The illustration above shows stages in manufacture commencing with the disk. The steel ingot is first rolled into a cylindrical bloom which is cut into disks of desired length by a rotary shear. This disk, Figure 1, is forged cross grained to the axis of the wheel; the center of ingot and disk becomes the center of the hub which is punched out (and finally rough bored). Then rolling is performed on the tread, flange and web with the result that in the finished article the finest texture is found in the rim.

It has been well demonstrated that by this method it is possible to produce the very highest quality of wheels for electric railway service. More than 300,000 are now under electric railway equipment—a conclusive proof of satisfactory service.

Due to the success of this method, Carnegie Steel Company has offered to the trade steel gear blanks also made from selected rolled steel disks. These are furnished to gear cutters for further treatment. A blank as it appears ready to have the teeth cut is shown in Figure 2. This company forges a complete range of carbon steel blanks from 6 to 44 inches in diameter, 25 pounds minimum weight.

Figure 3 shows a standard electric railway service wheel—our section S-1933—which will be on exhibit in the booth of the American Electric Railway Engineering Association at the American Electric Railway Association Convention at Atlantic City, October 11th to 15th, 1920.

Full information on the subject is contained in the Carnegie booklet—Wrought Steel Circular Sections—a copy of which can be obtained from any district office. Our engineers will be glad to confer with you on any problem—be it track or rolling stock.

Carnegie Steel Company

General Offices: Carnegie Building, Pittsburgh, Pa.

F.C.S. Wheels

have the Right Material in the Right Place

The surface of tread and flange contains three and one-half per cent carbon white iron, harder than tool steel, insuring long wear.

The softer hub permits easy machining.

The arched face plate gives additional strength.

Reasons why you should use GRIFFIN F. C. S. WHEELS

Less wearing away of metal of the flange.

Less chance for derailment at switch points and on curved worn rail because of freedom from sharp flanges.

Less wearing away of metal at the gauge of rail because the rubbing friction is at a minimum.

Less resistance to movement of the car.

Less resistance on curves.

Less power required for traction.

Less metal worn away from brake shoe per unit of work.

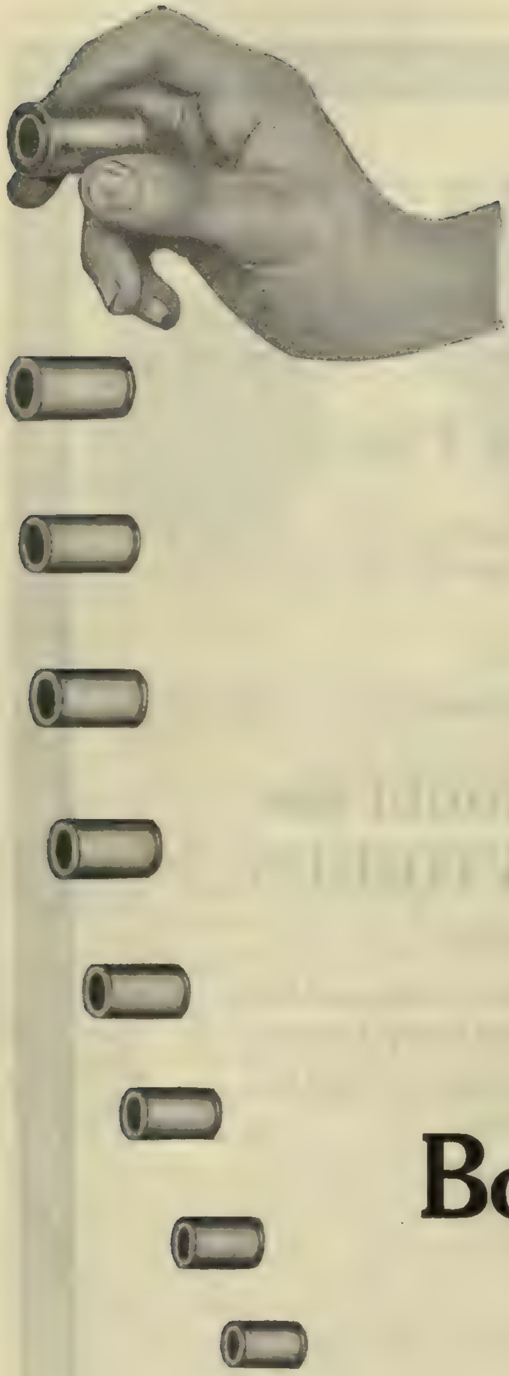
Less reduction in diameter per unit of service, therefore less labor in removing wheels to maintain the same diameter of wheel throughout the same car.

Griffin Wheel Company

McCormick Building, Chicago, Ill.

FOUNDRIES:

Chicago Detroit Boston Los Angeles Denver
St. Paul Tacoma Kansas City



“BOUND

Trade Mark

OIL-LESS GRAPHITE TROL

ARE BUILT TO OUT

THERE are lots of reasonsfor using “Bound Brook” Oil-less Graphite Bushings in preference to oil lubrication but here are three which your maintenance man will stamp as O. K.

1—No labor needed for filling or inspecting oil chambers.

2—No spattering of oil nor sputtering of arcs if the chambers are filled.

3—No trolley wheels to burn up if the chambers are *not* filled.

And as an oil-less bushing, please note that the grooves of a “Bound Brook” are filled with close-grained, densely packed *uniform* graphite, sothat there is little chance for starting the arcing that disintegrates and shortens the life of inferior graphite bushings.

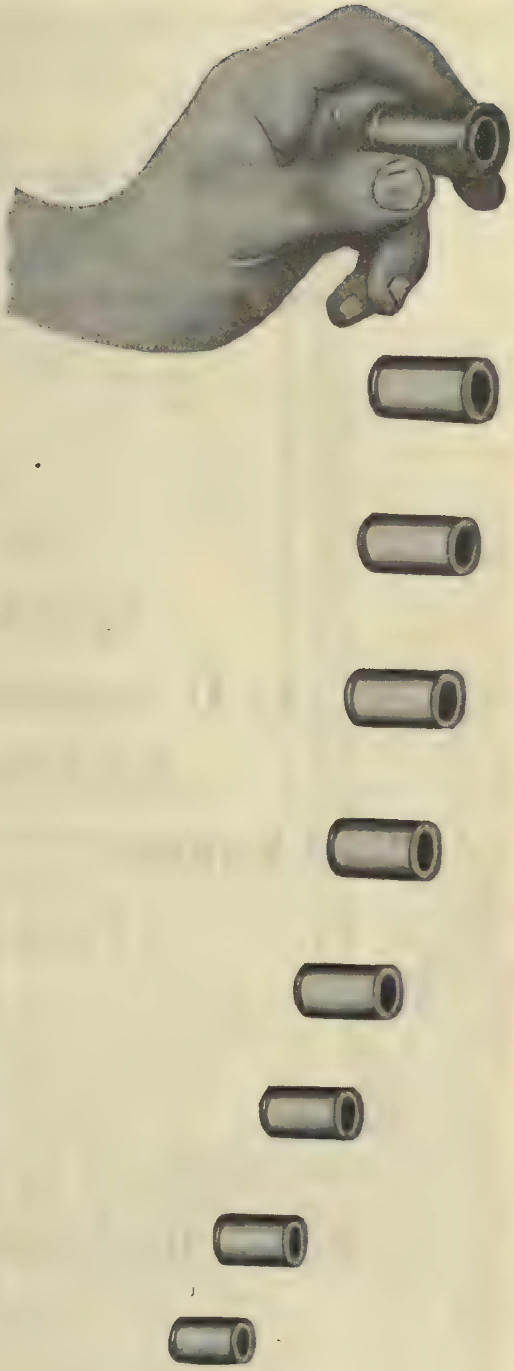
Bound Brook Oil-less

Bound Brook,

Detroit Office,

Genuine Graphited
Oil-less Bearings have
always been made at
Bound Brook, N. J., in
the United States
of America

BROOK”
Reg. U. S. Pat. Off.
LEY WHEEL BUSHINGS
LAST THE WHEEL



BUT to assure utmost bushing life the maintainer of “Bound Brook” Oil-less Bushings will keep close tabs on the line department to see that there are no high spots in the trolley; on the way department to see that there are no low spots in the track;

AND UPON HIMSELF TO SEE

1—That the trolley base tension is not too heavy;

2—That the shunts are kept tight to avoid overloading (and so overheating) the bushings;

3—That the bushings are installed firmly by means of compressed air instead of a sledge-hammer!

Then here will be attained always the “Bound Brook” Ideal of a laborless, oil-less bushing that outlasts the wheel.

Bearing Company

New Jersey

1723 Ford Bldg.

Specialists in the manufacture of Oil-less Bushings for more than a quarter of a century

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

S BRAND *"The 'Standard' Brand on your material is an assurance of eventual economy."* S BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

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CHICAGO
ST. LOUIS
HAVANA, CUBA

RICHMOND
SAN FRANCISCO
NEW YORK
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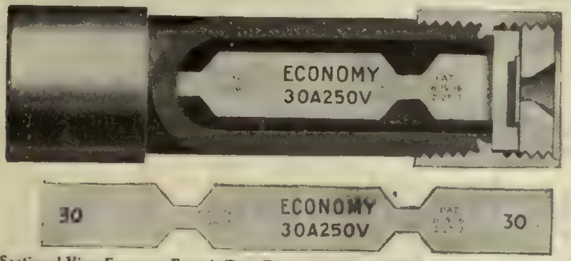
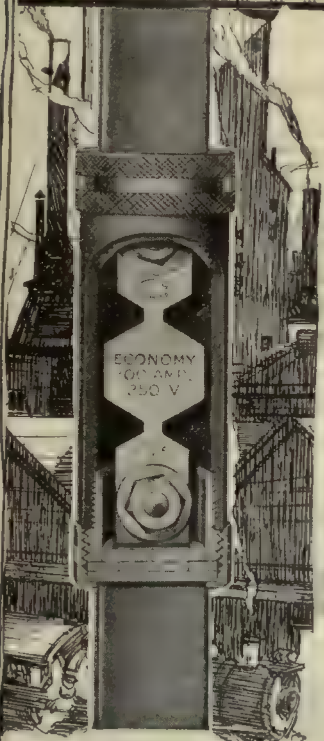
MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

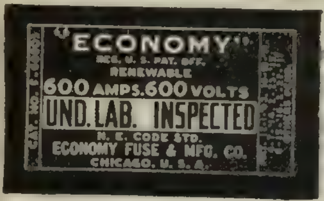


Sectional View Economy Ferrule Type Fuse and Economy "Drop Out" Renewal Link

ECONOMY *renewable* FUSES



Sectional View
Economy Knife Blade Fuse



Consider the Fuses in Your Plant

Proper protection of lives, property and machinery in all industrial plants using electrical energy depends upon the accurate functioning of fuses used.

Economy Fuses are absolutely accurately rated. They operate unfailingly when overloads, short-circuits and lightning discharges cause hazards to lives, apparatus and property.

Nothing is destroyed but the inexpensive strip of fusible metal — quickly and easily replaced by a new Economy "Drop Out" Renewal Link.

This feature cuts annual fuse maintenance costs 80% as compared to use of one-time fuses.

Avoid production delays; it requires but a minute to restore a "blown" Economy Renewable Fuse to its original efficiency.

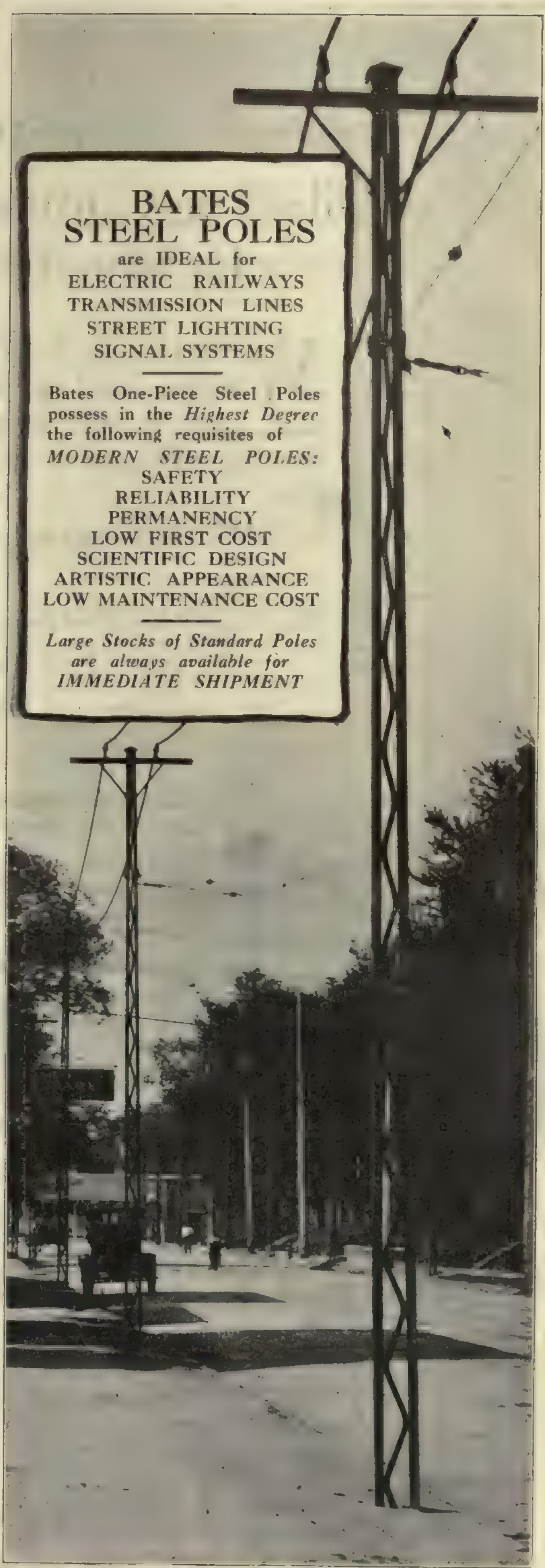
Instruct your electrician to install Economy Renewable Fuses at once.

For sale by all leading electrical jobbers and dealers.

Economy Fuse & Mfg. Co., Chicago, U.S.A.

Economy Fuses are also made in Canada at Montreal

Economy Fuses were the first line using an inexpensive bare link for restoring a blown fuse to its original efficiency to be approved in all capacities by the Underwriters' Laboratories.



BATES
STEEL POLES
are IDEAL for
ELECTRIC RAILWAYS
TRANSMISSION LINES
STREET LIGHTING
SIGNAL SYSTEMS

Bates One-Piece Steel Poles possess in the *Highest Degree* the following requisites of *MODERN STEEL POLES:*
SAFETY
RELIABILITY
PERMANENCY
LOW FIRST COST
SCIENTIFIC DESIGN
ARTISTIC APPEARANCE
LOW MAINTENANCE COST

Large Stocks of Standard Poles are always available for IMMEDIATE SHIPMENT

Our New 1921 TREATISE AND HANDBOOK sent upon request.

Bates Expanded Steel Truss Co.

208 South La Salle Street
CHICAGO, ILLINOIS

Of What Shall a Company Be Proud If Not Its Friends?

WE SHALL be pleased to meet our old friends and acquaintances and make new ones, at the Atlantic City Convention, October eleventh to fifteenth.

We will occupy space No. 536

THE CLEVELAND FARE BOX COMPANY
Cleveland, Ohio
Canadian Branch, Preston, Ontario

Improve their appearance and better their service with

"AMERICAN" BRAND Punches Buttons Badges

We have "grown up" with the Electric Railway Industry and our growth has been based on the durability and practicability of our products. You have a big line to choose from and a service based on 50 years experience to take advantage of.

Put the details up to us.

Send for catalog and samples. Write for prices.

AMERICAN RAILWAY SUPPLY CO.
134-136 CHARLES STREET, NEW YORK

Don't let high tension disturbances disturb electric train dispatching—use

THE PRIMO GIANT "VAC-M" LIGHTNING ARRESTER

This VAC-M lightning arrester is particularly adapted to protect long distance telegraph and telephone lines—such as used in electric train dispatching—from the effects of high tension disturbances.

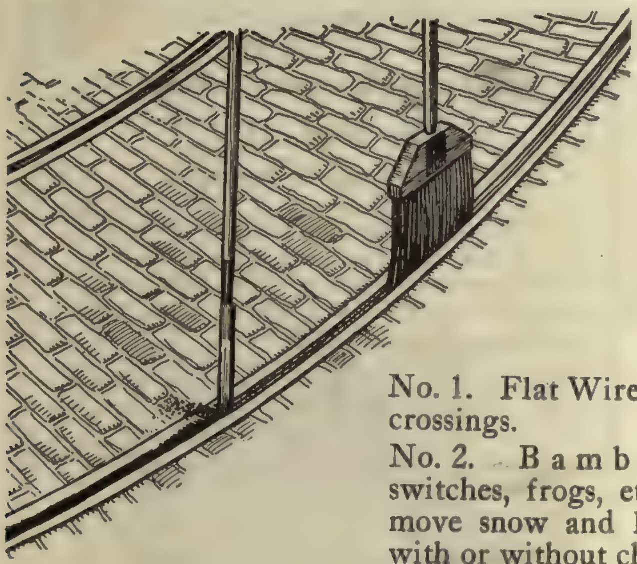
500 volts will cross the gap without permitting grounds.

VAC-M interferes in no way with service current; offers a low resistance path for static and induced current caused by proximity to high tension leads; permits no grounds on the line even though a cross with a cable carrying 500 volts should occur. Vacuum chamber extremely sensitive to lightning, static or induction, also sneak currents.

Altogether the best protection you can give your communication lines is the installation of VAC-M Arresters

Send for Booklet No. 11 describing complete line

The National Electric Specialty Co.
Terminal Bldg., Toledo, Ohio



Wherever Tracks Run You Need Paxson Brooms

No. 1. Flat Wire to sweep crossings.

No. 2. Bamboo for switches, frogs, etc., to remove snow and light dirt with or without chisel.

No. 3. Flat Wire for slush, mud and dirt, in curves and switches with or without chisel.

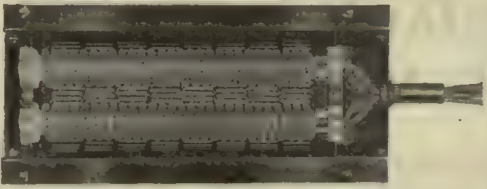
The chisel on end of handle for ice or other obstructions; also to throw switches.

Send for details.

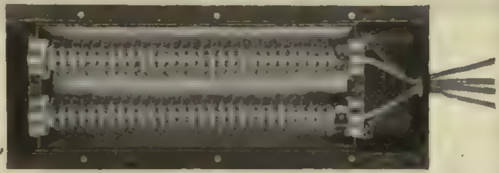
J. W. PAXSON CO.
1021 N. Delaware Ave., Philadelphia, Pa.

DO YOU Haul cars out of service to make heater repairs?

USE Long life electric heaters with interchangeable heating elements.



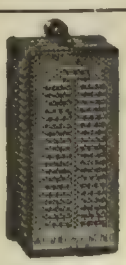
Standardized Cross Seat Heater



Standardized Panel Heater

Gold's Standardized Electric Heaters

Heaters of the different types that use but one standard heating element and resistance coil—Keep a few extra complete heating elements in stock for emergency, each of which can be applied to any heater in the car—Heater cases need never be removed—Exchange of elements have been made in seven minutes.



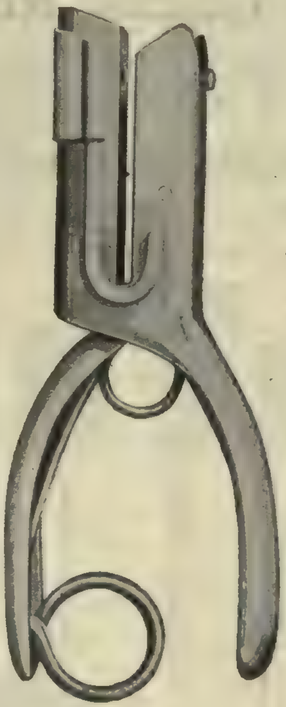
Thermostat

Gold's Thermostat Control

On the job every minute to save the current usually wasted.

Let us tell you more about these at Atlantic City. Or write for descriptive bulletins.

GOLD CAR HEATING & LIGHTING CO.
17 Battery Place, New York City



The McGill Utility Punch

A time saver and a labor saver. A handier, quicker working, easier-to-operate punch. Lowest priced high grade punch ever placed on the market. A punch for *every* conductor.

It fits the hand like a ball—no sharp edges or corners—a comfortable punch to handle.

Then there's the visible feature. The punched part of the transfer is seen at a glance. The slot is ⅛ inch wide, permitting 20 to 25 transfers to be punched at one time. Receptacle cap easily and quickly removed.

The McGill Utility Punch is made in 1½ inch reach and fractions thereof and furnished in ⅛, 3/16, and ¼ inch round dies. Substantially constructed to *last.* Write today for prices.

The McGill High Speed Changer

Here is a high speed changer that is a real improvement over any change carrier heretofore used. A new idea, based on what experience has shown to be the best in design and construction.

There are no rivets in the McGill High Speed Changer—the bottom plate is *one piece,* a feature which eliminates flexibility and fixes the ejection space so that there is no danger of ejecting more than the correct change.

This changer saves seconds at stops—minutes on trips—hours in a few days' runs. It means better service—better satisfied platform men—increased revenue.

Write today for prices on this money making change carrier.

McGILL METAL PRODUCTS CO.
1640-42 Walnut St., Chicago

Price $55.00

M-M-M HACK SAW MACHINE

Easily Portable. Weighs 110 lbs.

Cuts hardest and heaviest rails in forty minutes.

Handle throws back permitting train to pass.

Cannot be readily broken or put out of order.

Saves 40% of your present cost of cutting rails, and gives a perfect cut.

Is adjustable for angle cuts.

Carried In Stock

MANNING, MAXWELL & MOORE, Inc., 119 W. 40th St., New York, U.S.A.

You Can Bend Rails Quickly and Economically With a Watson-Stillman Hydraulic Rail Bender

Hydraulic Portable Rail Bender

The portable rail bender shown herewith is designed for use on the road. It is equipped with interchangeable formed bending blocks, and will make any bend without buckling. The hinged yoke permits the rails to be put in sidewise. It can also be used for other heavy bending.

We build many other handy tools for the railway shop. Such as: Crank Pin Presses, Wheel Presses, Forcing Presses, Forging Presses, Jacks, Pit Jacks, Punches, Shears, Pumps, Accumulators, etc.

Write for Catalogs.

The Watson-Stillman Co., 46 Church St., New York

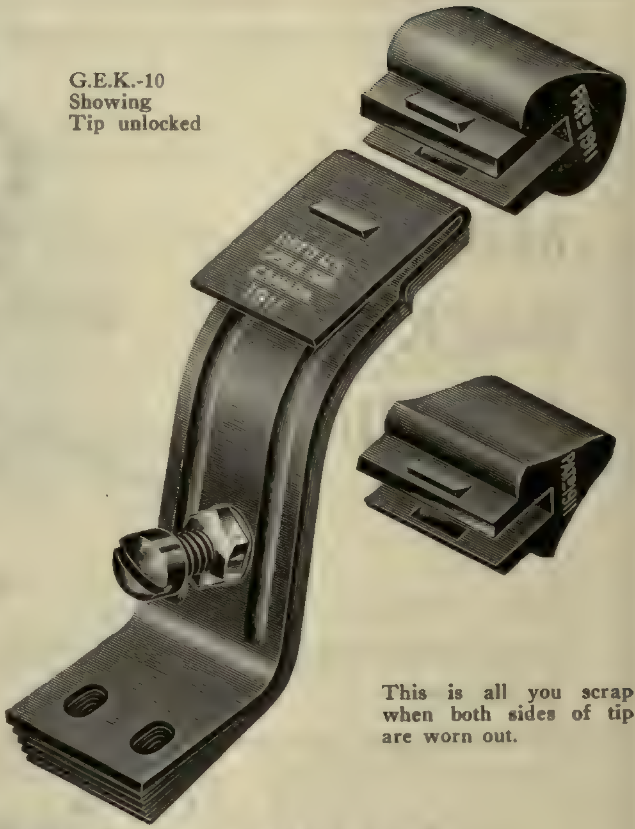
Chicago: McCormick Building Philadelphia: Widener Building

219

We don't make all the controller fingers used but we make the best—and every year adds to our long list of customers and those who once use triggerlock reversible controller fingers always want them as standard—in the past nine months our sales are fifty per cent more than during the whole of last year, and as the major part of this is to our old friends we are assured that they are obtaining perfect service—

There is a triggerlock finger for every type of controller. Specify them on your next requisition.

Call on us when at the convention.



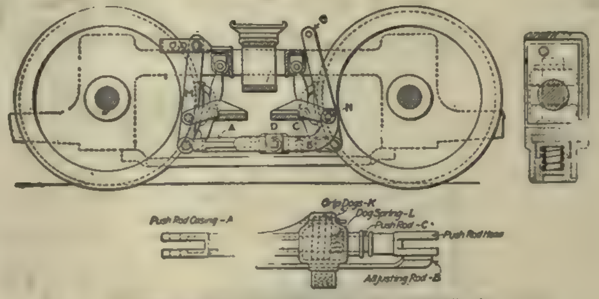
G.E.K.-10
Showing
Tip unlocked

This is all you scrap when both sides of tip are worn out.

RUSSELL MANUFACTURING COMPANY

814-18 Bath Ave., Niagara Falls, N. Y.
557 King St., West, Toronto, Canada

The Same Braking Power at all times with GOULD Slack Adjusters



DETAILS OF THE GOULD TYPE SLACK ADJUSTER AS APPLIED TO AN ELECTRIC CAR TRUCK

Their use means SAFETY at all times in braking. A predetermined piston travel is always maintained. And they are economical. All manual adjustment of brakes is done away with, less power consumed in car operation and a great saving in the wear and tear of car equipment is effected.

Gould Slack Adjusters pay for themselves in a very short time.

GOULD COUPLER COMPANY

30 East 42nd Street, New York
Works: *Depew*, Y.
Rookery Bldg., Chicago

The *Mileage* Armature Babbitt

Standard for Many Years

GUARANTEE

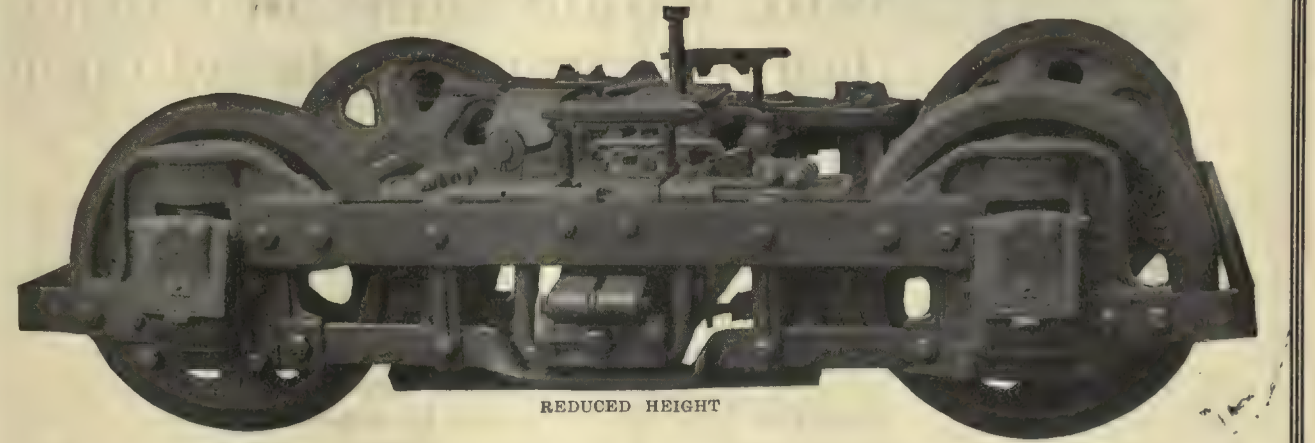
We *guarantee* our Metals to be made
100 per cent of *Virgin Raw Materials*
of the *Highest Grades at All Times*

It will pay you to investigate

E. L. Post & Co., Inc., Sole Manufacturers
50 Cliff Street, New York

R. H.

TAYLOR REDUCED HEIGHT TRUCK



TAYLOR R. H. TRUCK

Mounted on 26-in. Wheels with Springs Over Journal Boxes.
Designed to Mount Centre and End Entrance Cars Low Down.

SWING MOTION AND FULL ELLIPTIC SPRINGS

Wheel Base 5 ft. 2 in. For Car Bodies weighing 16,000 to 22,000 lb. Motors Inside Hung.

EASY RIDING

Journals 3¾ x 7 M. C. B. Type. Height from Rail to Body Bolster, 22¾ in. Brakes Inside Hung.

TAYLOR ELECTRIC TRUCK CO., TROY, N.Y.

SPECIFICATIONS ON REQUEST **Established 1892** **SEND FOR PORTFOLIO**

Safety First

Statistics prove that accidents on electric railways decreased 33 per cent during 1917 as compared with 1907. We're not surprised. And furthermore, accidents during 1918, 1919 and 1920 will show even greater decreases because the up-to-the minute, level-headed, energetic railway executive who is bound and determined to make a "go" of his property is specifying safety cars, and they're now being built in quantity in the Quality shops of the St. Louis Car Co.

St. Louis Car Company

St. Louis, Mo.

The Birthplace of the Safety Car

Our Specialties:

- Testing Sets
- Wheat stone bridges
- Condensers
- Meter A. C. and D. C.
- Galvanometers
- Pyrometers
- Indicating Ohmmeters
- Photometers
- Tochometers
- Laboratory standards of precision

Who would think of casting their net earnings as bread upon the waters?

But that is exactly what every electric railway is doing that purchases coal at a high figure and then permits its power to leak away through broken joints and faulty bonds.

Peerless Vawter Direct Reading Rail Bond testors will stop the drain on your coal pile by indicating the location of broken bonds and defective cross-overs and tie-ins.

One person can locate badly conducting bonds. The method of making and holding three contacts on the rail is sure and simple.

The scale of the instrument is so marked by numbers in black as to indicate resistance, in feet of rail under test, between the two contact points that span bond and by numbers in red to indicate the added resistance of bond in this spanned distance over and above the resistance of an equal length of solid rail.

MADE AND SOLD BY

THOMPSON-LEVERING COMPANY

ELECTRICAL MEASURING INSTRUMENTS

PHILADELPHIA, PA., U. S. A.

The Danight Lubricator

It lubricates car journals and other bearings at much lower temperatures than the old methods. The oiler consumes far less material and labor, and reduces the friction load so that heavier trains can be transported by the same power unit at greater speed.

It has been perfected after years of experiments in laboratories and exhaustive tests in actual service through severe winters and hot summers and is remarkable for simplicity, ease in applying, durability, perfect performance and enormous saving.

This is to be shown by G. P. Simmons and M. A. Kretchmar, BOOTH 525 at the A. E. R. A. Convention, Atlantic City, October 11 to 16, 1920.

HORROCKS DESK CO.
Herkimer, N. Y.

American Steel & Wire Company

Arc-Weld Rail Bonds

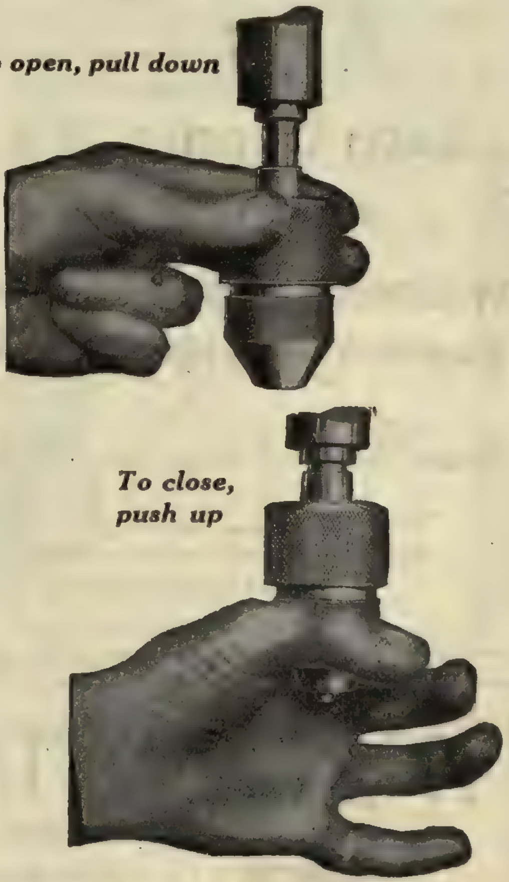
See this in
space numbers
552-553-554-555
at the
American Electric Railway
Association Convention,
Young's Pier, Atlantic City, N. J.
October 11-15, 1920

American Steel & Wire Company
CHICAGO
NEW YORK

The Efficient Way to Chuck Small Drills

First, start the Drill Press. Then while spindle is running—

To open, pull down



To close, push up

WAHLSTROM
Full Automatic Drill Chuck

HERE is the only automatic chuck that will hold drills numbered down to 0. As Tools may be changed instantly without stopping the spindle, the Wahlstrom effects a decided saving of time on sensitive high-speed drill presses. Sleeve does not revolve while changing tools. The grip is positive, will not slip, and locks automatically.

Sold with the Wahlstrom guarantee and sent on 10-days' trial.

MADE IN 2 SIZES
0 to ⅜ in., 0 to ½ in.

Send for Booklet

WAHLSTROM TOOL CO.
5520 Second Ave., Brooklyn, N. Y.

American Copper Products Corporation
(Formerly The W. A. Clark Wire Company)
Sales Office: 200 Broadway, New York
Factory: Elizabeth, New Jersey

Bare Copper Wire and Cables

Weatherproof Wire and Cables
Slowburning Wire and Cables
(Nat. Elec. Code Standard)

Brass Sheets—Copper in Rolls

Material furnished to conform to highest specifications

KERITE
used throughout for power lighting, signalling and interlocking
KERITE INSULATED WIRE & CABLE COMPANY
NEW YORK CHICAGO

INSULATING MATERIAL

T. C. WHITE ELECTRICAL SUPPLY CO.
1122 Pine Street, St. Louis, Missouri

"A Dependable Source of Supply"

Cotton Tape and Sleeving—Oiled Muslin and Tapes—Fibre—Sheets, Rods and Tubes—Friction and Rubber Tapes—Mica—Cut, Uncut and Band—Mica Plates, Rings, Segments—Fish Paper, Red Rope Paper, Press Board, Insulating Varnishes.

Write for Catalog

ROEBLING Trolley Wire
INSULATED WIRES AND CABLES
WELDING WIRE WIRE STRAND
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

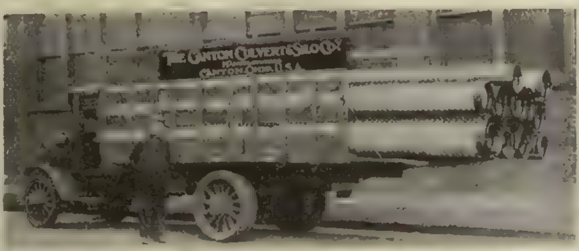
Peirce Forged Steel Pins with Drawn Sheet Steel Thimbles
Your best insurance against insulator breakage
Hubbard & Company
PITTSBURGH, PA.

1870-EUGENE F. PHILLIPS-1882
AMERICAN ELECTRICAL WORKS

WEATHERPROOF WIRE AND CABLE
PAPER INSULATED UNDERGROUND CABLE
(Single, Duplex and Three Phase)
TROLLEY WIRE
(Round, Grooved or Figure 8)
BARE COPPER WIRES AND CABLES
MAGNET WIRE
(Cotton or Asbestos)

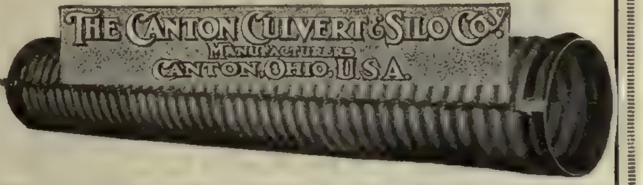
Americanite Rubber Covered Wire
Incandescent Lamp Cord
Galvanized Iron and Steel Wire and Strand

AMERICAN ELECTRICAL WORKS
Phillipsdale, R. I.
Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 100 1st Ave. So.



"ACME" (NESTABLE)
Anti-Corrosive Corrugated
Galvanized CULVERTS

Corrugated Culverts are easier to haul than other types of culvert. They do not require such careful handling and besides—they will not break or crack while being hauled over rough roads. Small orders of "ACME" (Nestable) Corrugated Culverts, shipped set-up, are easily hauled in a truck as shown above. However, when the order is of good size or when it involves a long haul, it pays to have "ACMES" shipped knocked down. Let us tell you why. Write to Dept. M-24.



Unloading Hopper Bottom Cars with a Scoop Conveyor
No Track Hopper or Pit Is Necessary

THE SCOOP CONVEYOR

An original, distinctive and serviceable labor-saving machine for storing, reclaiming and transferring material, for loading and unloading cars, trucks and wagons.

Thousands In Use

Our 1920 model, the result of *experience, standardization and quantity production,* embodies life-prolonging and service-giving improvements. Made in six different sizes. Complete, with Electric Motor or Gasoline Engine.

Write for Catalog No. 57.

Portable Machinery Co., Passaic, N. J.

The Babcock & Wilcox Company
85 Liberty Street, New York

WATER TUBE STEAM BOILERS

Steam Superheaters Mechanical Stokers

Works: BARBERTON, OHIO—BAYONNE, N. J.

BRANCH OFFICES:

ATLANTA, Candler Building
BOSTON, 49 Federal St
CHICAGO, Marquette Building
CINCINNATI, Traction Building
CLEVELAND, Guardian Building
DENVER, 435 Seventeenth St
HAVANA, CUBA, Calle de Aguilar 104
HOUSTON, TEXAS, Southern Pacific Bldg.
LOS ANGELES, I. N. Van Nuys Bldg.
NEW ORLEANS, 533 Baronne St.
PHILADELPHIA, North American Bldg.
PITTSBURGH, Farmers' Deposit Bank Bldg
SALT LAKE CITY, 705-6 Kearns Bldg.
SAN FRANCISCO, Sheldon Bldg.
SAN JUAN, Porto Rico, Royal Bank Bldg.
SEATTLE, L. C. Smith Bldg., Rooms 1914-1917
TUCSON, ARIZONA, Santa Rita Hotel Bldg.

BAKELITE-DILECTO

The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods.
The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate.

The Continental Fibre Co., Newark, Delaware
Branch Offices:
CHICAGO, 332 S. Michigan Ave. NEW YORK, 233 Broadway
Pittsburgh Office, 301 Fifth Ave. San Francisco Office, 525 Market St.
Los Angeles Office, 411 S. Main St.
Canadian Office, Cor. King and Yonge Sts., Toronto, Ont., Can.

WE-FU-GO AND SCAIFE
WATER
PURIFICATION SYSTEMS
SOFTENING & FILTRATION
FOR BOILER FEED AND
ALL INDUSTRIAL USES
WM.B.SCAIFE & SONS CO. PITTSBURGH, PA.

HIGHEST QUALITY

TRACK SPECIAL WORK

HIGHEST QUALITY SAFETY DURABILITY
FROGS CROSSINGS SWITCHES STANDS
C F & C

WE MAKE THIS GRADE ONLY

CLEVELAND FROG & CROSSING CO.
CLEVELAND, OHIO

Why Use Makeshifts?

WHY waste time and energy with makeshift devices for boring operations when Williams' "Agrippa" Adjustable Boring-Tool Posts offer convenience and efficiency developed to the *n*th power?

Each Post accommodates a wide range of Bars, the height of which is readily adjusted; a turn of the Knurled Ring raises or lowers the base on which they rest. The whole device is instantly and rigidly locked by tightening the Set Screw. Four Sizes of Posts for ½ inch to 2¼ inch diameter bars—furnished with or without Bars.

J. H. WILLIAMS & CO.
"The Drop-Forgings People"
Brooklyn Buffalo Chicago

Williams' "Agrippa" Adjustable Boring-Tool Posts

TRACTIONS POWER GEARS OF ROLLING STOCK PROTECTED WITH

BORNE SCRYMSER COMPANY
METAL LIFE
FOR
- CABLES -
GEARS
PINIONS
80 SOUTH ST. NEW YORK

ASK US FOR FACTS

Work Made Easier By Using Comstock Electrical Appliances

Field Coil Forms

Diamond Manufacturing Co., Wyoming, Pa.

- Field Coil Forms
- Armature Coil Forms
- Coil Presses
- Forming Machines
- Pulling Machines
- Armature and Field Coil Winding Machines

Winding Machine →
Face Plate in winding machine can be used either in perpendicular or horizontal position

FOSTER SUPERHEATERS

A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

Power Specialty Company Boston Chicago Philadelphia San Francisco Pittsburgh London, Eng. 111 Broadway, New York

Simplex Jacks

for
Railroads - Contractors - Industries
Automobiles - Pole Pulling and Ordnance

Templeton, Kenly & Co., Ltd.
Established 1899
London Chicago Paris

Keep your Eye on the
SEARCHLIGHT SECTION
and your advertisements in it

612

MILWAUKEE OIL STORAGE SYSTEMS

SELF-MEASURING PUMPS
KANT-LEEK OIL TANKS
with
UNDERWRITER'S LABELS

CAR JOURNAL WASTE SATURATING OUTFITS

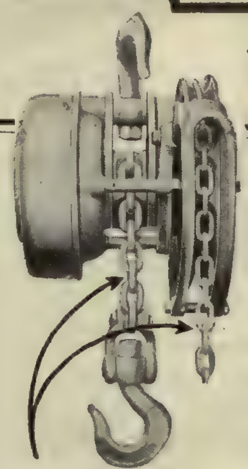
SEND FOR SPECIAL RAILWAY EQUIPMENT CATALOG

AS MANY TANKS AS DESIRED IN A SERIES

MILWAUKEE TANK WORKS
MILWAUKEE, U.S.A.

YALE

Yale Made Is Yale Marked



Die-formed and Die-forged Steel Chain

Steel Chain Another Yale Safety Factor

YALE Chain Blocks have for many years been equipped with special steel chain.

Every link in every Yale chain is die formed and die forged, with the weld on the *side* of the link instead of at the end.

These Yale Chains have over twice the strength of ordinary iron chain. They are actually tested to three times the rated capacity of the block on which they are used.

For every job where loads must be lifted, moved or held steadily in place, the Yale Spur-Geared Block—"*From Hook to Hook a Line of Steel*" is *safe* and *satisfactory*.

Screw-geared and Differential Chain Blocks, Electric Hoists

Carried in stock by representative supply houses. Detailed descriptions in new Hoist Catalog—sent on request.

For a Factory Locking Equipment
Use a Yale Master Key System

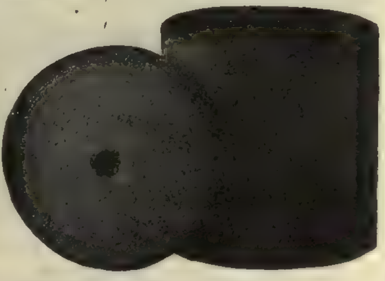
The Yale & Towne Mfg. Co.
Makers of the Yale Locks
Stamford Connecticut

SPUR-GEARED BLOCK

HOPE Brand *for best results*

Webbings and Tapes made from the best raw materials—made with the most up-to-date machinery and most reasonably priced. That's what you get in Hope Products.

Send for Samples.



HOPE WEBBING CO.
Providence, R. I. 396 Broadway, New York

M-R INSULATION MFG CO

"Everything in Insulation"

Mica	Waxes
Vulcanized Fibre	Asphalts
Varnished Cloth	Compounds
Insulating Tapes	Insulating Varnish

The above are only a few of our products
Write us for anything in this line you may require.
MITCHELL-RAND M'F'G CO.
103 John St., New York City

162 RAILROADS
USE DIXIE CUP
Penny Vending Machines
To Solve their Drinking Cup Problems
in Cars and Stations
INDIVIDUAL DRINKING CUP COMPANY, INC.
HUGH MOORE, President
Original Makers of the Paper Cup — 220-230 W. 19th Street New York

Insurance Doesn't Pay All Losses

KILL FIRE!

Before it has a chance to gain headway, and before it destroys equipment which cannot be replaced in a day! Kill fire with the

CASTLE
Liberty No. 1
Fire Extinguisher

A Three-Gallon Carbon Tetrachloride Type, Hand Pump Fire Extinguisher which has sufficient capacity to extinguish almost any fire apt to happen around the Power House.

Comparative and competitive tests have proved that a CASTLE LIBERTY No. 1 can extinguish fire that could not be controlled by twenty-eight one-quart fire extinguishers.

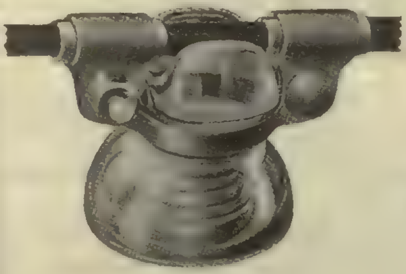
The extinguishing agent is Castle Liquid, approved for Government use and used by leading Corporations, Railroads and Governmental Departments.

Write for complete description. Write for "Safe Always" telling the real story of fire extinguishing liquids.

James M. Castle, Inc.
812 Lincoln Bldg.
Philadelphia, Pa.

Manufacturers and Distributors of Fire-Extinguishing Apparatus

Salesmen desired in unoccupied territory


TYPE C

Insulator Clamps
For all purposes.
Splicing Sleeves
Of Seamless Copper (*Guaranteed*).
Protective Clamping Sets
For High Tension Crossings (*Approved*).

Brass-Bronze Castings
To Specification.
Write for information.

The Clark Electric and Manufacturing Company
Singer Building, New York

TYPE S.

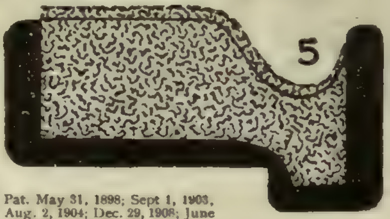
Wheel Condition No. 5

Especially for Removing Flat Spots

When the read and flange both need grinding you can do it without removing the car from service by using this type of wheel Truing Brake Shoe.

There are 500 different styles of patterns.

Write for the list of roads using them.



Pat. May 31, 1898; Sept 1, 1903, Aug. 2, 1904; Dec. 29, 1908; June 15, 1909; April 21, 1914.

Wheel Truing Brake Shoe Co.
DETROIT, MICHIGAN

McGuire-Cummings Mfg. Company

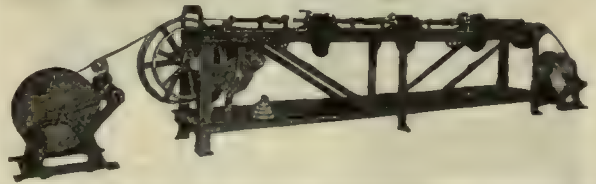
General Offices—111 West Monroe St., CHICAGO

City and Interurban Cars and Trucks, Snow Sweepers and Plows

Express, Combination and Work Cars, Electric Locomotives

EST. 1865 AIMCO INC. 1916
"American" Insulating Machinery Company
REG. U.S. PAT. OFF.
PHILADELPHIA PENNSYLVANIA U.S.A.

"American" Electric Railway Automatic Signals.
RECLAIMING MACHINES } for recovering
INSULATING MACHINES } insulated wire



Use only Awebco Tape on your Armatures

ANCHOR WEBBING COMPANY
300 Brook Street, Pawtucket, Rhode Island

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

The Cooper Heater Company
Carlisle, Pa.

"It Behooves You to Hooverize Your Motormen"

We can help you
Write to
The Arthur Power-Saving Recorder Co.
2nd National Bank Bldg., New Haven, Conn.

UNIVERSAL ANTI-SLIP TREADS
cars and station steps.

Universal Safety Tread Company
40 Court St., Boston, Mass.

See the Crank of the
CREAGHEAD DESTINATION SIGN
By means of it, conductor or motorman can change sign without leaving platform. All that has to be done is to turn the crank. Better investigate.

CREAGHEAD ENGINEERING CO., CINCINNATI, O.

I-T-E

CIRCUIT BREAKERS

THE CUTTER CO., PHILADELPHIA

G. T. ABEL

Woodhaven, N. Y.

Railway Equipment

Bought, Sold, Exchanged

Car Painting by Car Painters

Contracts to paint your cars in your own barns

Elevated Station, B. R. T. Co. Brooklyn, N. Y.

Also for roofs

JOHNS-MANVILLE Transite Asbestos Wood is an absolutely fireproof building material that is valuable not only for paneling, doors and partitions, but also for roofs.

Public Utilities have found it particularly desirable for roofing passageways, where to obvious weatherproof qualities must be added absolute immunity to fire and decay.

The nearest Johns-Manville branch can give you detailed information about the adaptability of Transite Asbestos Wood to your requirements.

JOHNS-MANVILLE
(Inc.)
Madison Ave. at 41st St., New York City
10 Factories—Branches in 64 Large Cities
For Canada: Canadian Johns-Manville Co., Ltd., Toronto

JOHNS-MANVILLE

Transite Asbestos Wood

Johns-Manville Service Covers the Continent

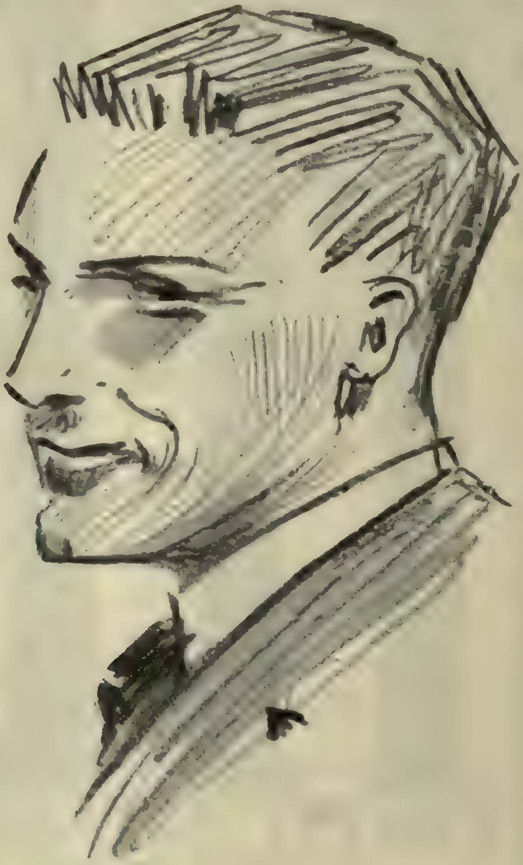
Through—

Asbestos

and its allied products

JOHNS-MANVILLE
Serves in Conservation

Heat Insulations, High Temperature Cements, Asbestos Roofings, Packings, Brake Linings, Fire Prevention Products



Here's
the best sales-story
yet!!

A certain big company had an electric generator lying around its plant for about two years. During that time letter after letter was sent to its numerous branch offices asking if any of them could use it. Finally the company decided to run a "blind" ad in the Searchlight Section—and a few days later got a wire for the machine from one of its own branch houses.

What direct personal letters did not accomplish in *two years,* "Searchlight" advertising did in *two weeks!* Maybe "Searchlight" appeared at the psychological moment but—

These facts are evident: "Searchlight" is so well known and has such a complete circulation that it can be depended upon to find buyers wherever they may be—even among the owners' branch offices.

For Every Business Want
"*Think* SEARCHLIGHT *First*"

SEARCHLIGHT SECTION

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

ADVERTISING RATES

POSITIONS VACANT—Business Opportunities and other undisplayed ads. 8 cents a word, minimum $2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment. 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:
1 to 3 in., $4.50 an in.
4 to 7 in., $4.30 an in.
8 to 14 in., $4.10 an in.
15 to 29 in., $3.90 an in.
30 to 49 in., $3.80 an in.
50 to 99 in., $3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

ACCOUNTANT, as assistant general auditor in Manila, Philippine Islands, must be familiar with electric railway and electric light accounting. Knowledge of Spanish advantageous. State age, experience and salary expected. P-754, Elec. Ry. Jour.

ACCOUNTANT and office executive wanted for public utiliy in Souhern New York. The position requires a man capable of directing the accounting of a public utility and also one familiar with financing and handling creditors. Man with public utility experience in New York State preferred. Apply in writing, giving age, experience, reference and whether married or single. A good position is open for the right man. P-755, Elec. Ry. Journ.

AUDITOR for electric railway in eastern city; highest character, ambitious, familiar with public service commissions' systems and rulings. P-750, Elec. Ry. Journ.

MANAGER wanted for medium sized New England property, city and suburban, entire charge of operation, maintenance, etc. State age, experience and salary expected. P-756, Elec. Ry. Journ.

MOTOR instructor wanted, thoroughly competent to instruct motormen in the proper use of air and electric equipment in an eastern city. P-753, Elec. Ry. Jour.

PERMANENT position open for several draftsmen with knowledge of street railway track work. New York Switch & Crossing Co., 15th and Madison Sts., Hoboken, N. J.

STREET railway special track draftsman and designer familiar with girder rail special work. Very good position for the right man, with excellent future. No advance fee. Address The Engineering Agency, 53 W. Jackson Blvd. Chicago, Ill. Established twenty-eight years.

SUPERINTENDENT or assistant superintendent wanted for electric street railway in the tropics. Operating fifteen miles of track, transporting eight million passengers per annum. Applicants must give full particulars as to previous employment and experience, stating age and salary required. Photograph of applicant requested. P-751, Elec. Ry. Jour.

WORKING foreman wanted on small southern road running fifteen cars, city of 20,000 population. Must be first class armature winder on 506 A-2 motors. Able to handle labor; attend to general overhauling and maintenance of street railway equipment. Want reference from past and present employers. State salary wanted in answering. P-752, Eec. Ry. Jour., Real Estate Trust Bldg., Phila.

YOUNG man wanted for superintendent of small but prosperous street railway in Cuba. Must be strictly sober. Give age, experience, references and salary required. P-748, Elec. Ry. Jour.

POSITIONS WANTED

GENERAL superintendent of electric light and street railway wishes to make a change; age 34, married; 14 years' experience in electric light and street railway business with present company; references, present employers. PW-743, Elec. Ry. Journ., Old Colony Bldg., Chicago.

MASTER mechanic desires to make change. 17 years' experience in all departments maintenance and construction, including Type M. and H. L. control; successful in handling labor; best of references furnished. PW-745, Elec. Ry. Journ., Real Estate Trust Bldg., Philadelphia.

THOROUGH railroad man desires change; 12 years experience as dispatcher, motor instructor and trainmaster. Thoroughly experienced in transportation details, automatic air and multiple unit control. Can handle men successfully. Have a proven record. PW-747, Elec. Ry. Jour., Old Colony Bldg., Chicago.

WANTED
One Universal
Woodworking Machine
Communicate with
ARKANSAS VALLEY INTERURBAN RAILWAY COMPANY
Wichita, Kansas.
C. R. Lewis, Superintendent.

WANTED
ROTARY CONVERTER
1—300 KW., 60 Cycle, 6 Phase
C. S. B. & N. I. RY. CO.
South Bend, Ind.

FOR SALE

16 West. 56 Motors. 4 K-14 Controllers. 4 National type BB-4 Air Brake Equipments complete. 15 Double Truck Cars, 40-ft. long, mounted on Brill Trucks equipped with 4 GE-67 Motors, 2 K-6 Controllers, Air Brakes, etc., complete.

Electric Equipment Co.
Commonwealth Building, Philadelphia, Pa.

New Safety Cars
FOR SALE

Eight new single truck, double end, one-man safety motor passenger cars with two motors all fully equipped ready to run. Colors green and buff in enamel (numbered but not lettered).

Shipment Immediately from Car Works.

Federal Light & Traction Company
60 Broadway, New York, N. Y.

WANTED
RECORDING FARE REGISTERS
Prefer recording fare register made by
The Recording Fare Box Co., New Haven, Conn.
MIDDLETOWN TRANSPORTATION CO., Middletown, Ohio

IMMEDIATE DELIVERY

Twenty-Five Cycle Rotary Converters

2—300-kw. 3-phase, 25-cycle, 600-volt, General Electric rotary converters, complete with transformers, primary voltage 13,200, secondary 380-volts.
1—250-kw., 3-phase, 25-cycle, 600-volt, General Electric rotary converters, complete with transformers, primary voltage 13,200, secondary 380 volts.

Street Railway Motors

20—G. E. 800's, complete with controllers.

All in Splendid Condition

JOSEPH MYERSON, 411 Atlantic Ave., Boston 9, Mass.

STREET CARS

3—32-ft., 4-ft. 8½-in. ga. closed motor cars; seating capacity 32. Symington-Baldwin trucks. First Class. Will convert to one man operation if desired.

4—22-ft., 4-ft. 8½-in. ga., open trailers; seating capacity 35. Taylor McGuire trucks. Good.

ZELNICKER IN ST. LOUIS

For a list of hundreds of other unusual bargains in Rails, Railway and Industrial Machinery and Equipment write for Our Latest General Bulletin.

---

700 tons new 9 in.

GIRDER RAIL

Penna Steel Co. section 228. 112 lb. to the yard. Price—$45 per gross ton, f.o.b. cars Brooklyn, N. Y. Subject to R. W. Hunt & Company's inspection.
Prompt shipment.

H. M. FOSTER CO.
Continental Building, Baltimore, Md.

New—Used—Rebuilt

MACHINERY AND SUPPLIES
for construction and industrial work.

READING ENGINEERING CO., INC.
154 Nassau St., New York

Armature Coil Taping Machine

Saves Time, Labor and Money

A boy can tape 40 coils for Westinghouse 12A Armature in an hour. Further particulars gladly furnished.

Geo. M. Griswold Machine Co.
New Haven, Conn.

MACGOVERN & COMPANY POWER MACHINERY

114 Liberty St., New York, N. Y.

IMMEDIATE DELIVERY FROM STOCK

STREET RAILWAY MOTORS

34 Westinghouse No. 56, complete with gear cases, gears, pinions and axle bearings, gear ratio 16:66.

Further information gladly furnished upon request.

BRANCH OFFICES:
Pittsburgh, Pa.: 498 Union Arcade Bldg.
Seattle, Wash.: L. C. Smith Bldg.
Montreal, Que.: 285 Beaver Hall Hill

FOR SALE

Six Transformers

36 2/3 K. V. A.; 2200/188 volts; single phase; 60 cycles; oil insulated, self cooled; Westinghouse Type S. K. R.

F.S. 749—Elect. Railway Journal
Leader News Bldg., Cleveland, Ohio

5—RY. ROTARIES, 300 KW.
with 25 cy., 3 ph., 15000 v., Trans and SWBD.

1—RY. ROTARY, 400 KW.
3—4600 v., 60 cy., Trans—600 v., D.C.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

Passenger Cars and Motors

4—All steel PASSENGER CARS, complete, mounted on Baldwin 18C trucks.

4—West. MOTORS, 328A.
Will be released about Nov. 1.

WESTMORELAND CO. RY. CO.
Derry, Pa.

FOR SALE

18—12 Cross Seat, double truck open cars. Built by The St. Louis Car Co.

8—10 Cross Seat, double truck open cars. Built by Barney & Smith Car Co.

These cars are fully equipped and in good operating condition.

The Columbus Railway, Power & Light Co.
104 N. Third St., COLUMBUS, OHIO

NEW REBUILT **ELECTRIC MOTORS** REWINDING REPAIRING

NEW A.C. MOTORS ¼ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLANT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.
EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND, O. *INC. 1918*

Caution—RAIL USERS

BUY NOW. There is a SCARCITY. We offer the following NEW RAILS for prompt shipment:

New 12-lb. and 30-lb. rails, splices, bolts and nuts.

New 90-lb. rails, angle bars, bolts, nuts and spikes.

They will be gone soon. Write or wire for our quotations.

Wire—300,000 lb. or more of copper trolley, feeder, high tension, etc.

A number of steel bridges on line of Cincinnati & Columbus Traction Co. For quick acceptance at $1.00 per 100 lb. as is. Photographs on request.

HYMAN-MICHAELS COMPANY
531 Peoples Gas Bldg., Chicago

BRANCH OFFICES: First National Bank Bldg., Pittsburgh, Pa.; Railway Exchange Bldg., St. Louis, Mo.; East Chicago, Ind.; New York: Woolworth Bldg.
YARDS AND WAREHOUSES: East Chicago, Ind. and St. Louis, Mo.

FOR EVERY BUSINESS WANT
"*Think* SEARCHLIGHT *First*"
0109

NEW

80 lb. RAIL & ACCESSORIES

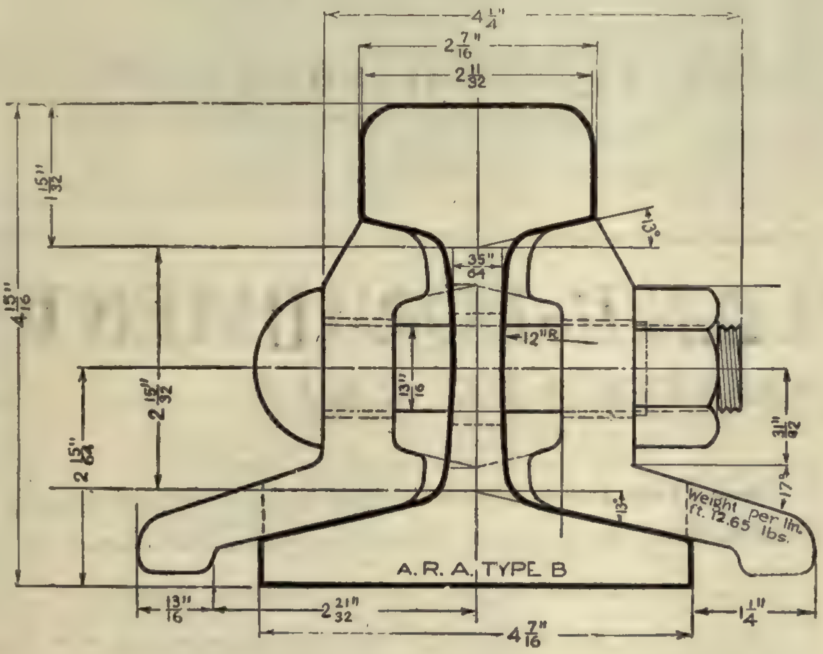
ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

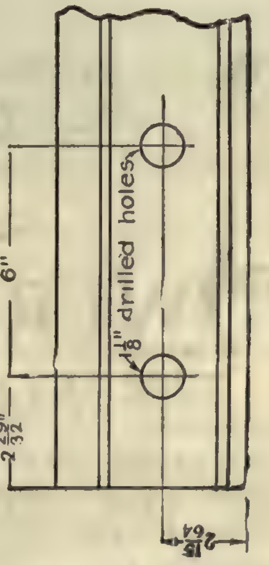
For Sale

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.





Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

St. Louis Office
2115 Railway Exchange Building

We buy electric and steam railways that are to be dismantled

Passenger Cars and Snow Plows

FOR SALE

Twelve—34 Ft., Easy Access double truck cars—"M." Control—will furnish trucks and motors if desired and put cars in good operating condition.

Two Hundred—25 Ft., to 30 Ft., double truck closed cars with vestibules platform complete with trucks, motors "K" control—ready to run.

These cars can easily be rebuilt for PREPAYMENT operation if desired.

Two Hundred—12, 13, 14 and 15 Bench double truck open cars—in good condition—with equipment if desired—available for immediate delivery—and ready to run.

A number of single truck SHEAR SNOW PLOWS—equipped with motor—ready for next Winter's service

TERMS—Cash or easy payments—Car Trust Certificates if desired

EASTERN MASSACHUSETTS STREET RAILWAY CO.

Address Purchasing Dept. **No. 1 Beacon Street, BOSTON, MASS.**

POWER PLANT EQUIPMENT

FOR IMMEDIATE SALE

GLOUCESTER, MASS.:

2—203 hp. B. & W. Water tube boilers
1—266 hp. B. & W. Water tube boiler
1—600 hp. B. & W. Water tube boiler
1—300 hp. 22 in. x 48 in. Harris-Corliss Single Engine
1—500 hp. 28 in. x 36 in. Hamilton-Corliss Single Engine
1—1500 hp. 30 in. x 48 in. x 48 in. Penn-Corliss Cross Compound Engine
1—250 kw. W. H. Belted Multipolar D.C. Generator
1—400 kw. G. E. Eng. Type Multipolar D.C. Generator
1—850 kw. G. E. Eng. Type Multipolar D.C. Generator
Switchboard and Misc. Auxiliary equipment

NEWBURY, MASS.:

3—115 hp. Kendall Horizontal Return Tubular Boilers
2—14 in. x 28 in. x 36 in. Slater-Corliss Cross Compound Engines
2—250 kw. W. H. Eng. type Multipolar D.C. Generators
Switchboard and Misc. Auxiliary equipment

ESSEX, MASS.:

2—150 hp. Kendall Horizontal Return Tubular boilers
1—150 hp. new eng. horizontal return tubular boiler
2—13 in. x 23 in. x 22 in. McIntosh & Seymour Tan. Com. High Speed Engines
2—220 kw. Walker Eng. Type Multipolar D.C. Generators
1—55 kw. G. E. Direct connected 200 volt Booster Set.
1—150 hp. New Eng. Boiler
Switchboard and Misc. Auxiliary equipment

LAKEVILLE, MASS.:

3—250 hp. A. & T. Water Tube Boilers
1—16 in. x 30 in. x 42 in. Hamilton-Corliss Cross Compound Engine
1—325 kw. W. H. Eng. Type Multipolar D.C. Generator
Switchboard and Misc. Auxiliary equipment

SALEM, MASS.:

1—2500 A.B.H. G. E. Curtis Horizontal 60 Cycle, 445 volts A.C. Turbo. Generator and Direct connected Exciter
1—Alberger Spiroflo jet condenser and Auxiliaries.

HYDE PARK, MASS.:

3—500 hp. B. & W. Water Tube Boilers
1—1500 hp. 30½ in. x 52 in. x 48 in. Penn Cross Compound Engine
1—750 hp. 20 in. x 40 in. x 48 in. Greene Cross Compound Engine
1—700 hp. 20 in. x 40 in. x 42 in. Penn. Cross Compound Engine
1—850 kw. G. E. Direct Connected D.C. Generator
1—525 kw. G. E. Direct Connected D.C. Generator
1—500 kw. G. E. Direct Connected D.C. Generator
Condensers, Pumps, Blowers, Boosters, Switchboard and Miscellaneous Auxiliary equipment.

Inspection Solicited—Details upon Application.

Terms Cash or Easy Payments. Car Trust Certificates if Desired.
Equipment released on account of purchasing power.

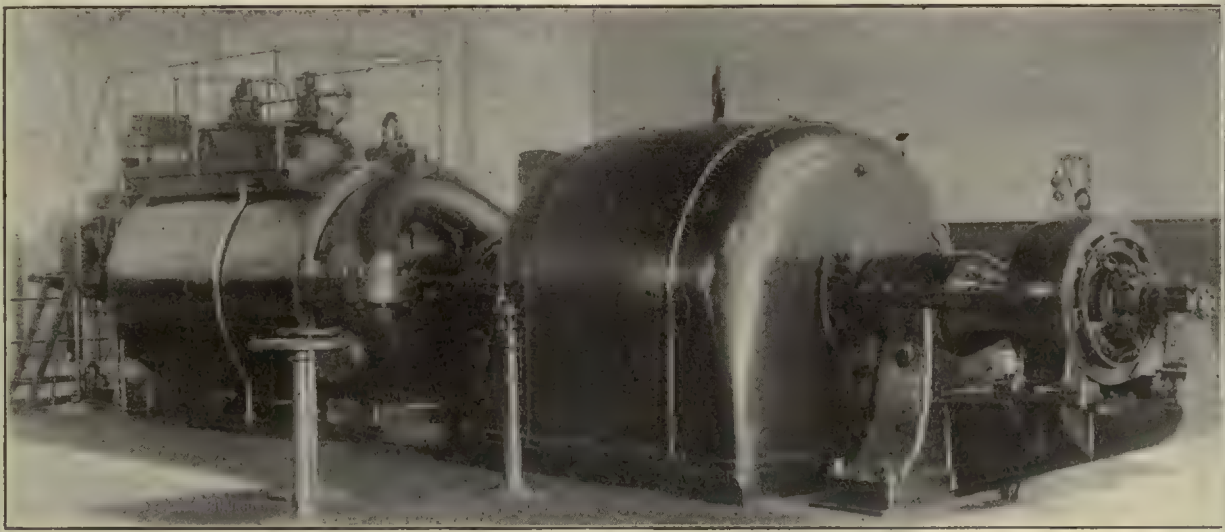
EASTERN MASSACHUSETTS ST. RY. COMPANY

Address Purchasing Dept. **1 Beacon Street, Boston, Mass.**

ARCHER & BALDWIN

INCORPORATED
114 LIBERTY ST. NEW YORK
PHONE 4337-8 RECTOR

Machinery in Stock for Immediate Shipment



1—2500/3000 Kw. Westinghouse Turbine. 1200 r.p.m., 3-phase, 60-cycle, 2300 volts, recently rebuilt and adapted for 200-225 lb. steam pressure with superheat. Condensing equipment consists of Deane Jet Condenser with motor driven air and circulating pumps; also all intermediate piping connections. Steam turbine equipped with bronze type blading. Instant shipment. Send for full particulars including economies.

ALTERNATING CURRENT UNITS
(Turbine and Engine Driven)

1—12,500-kva., 10,000-kw. Westg., 3-ph., 60-cy., 13,200-v., 1800 r.p.m. Turbo Unit with LeBlanc Jet Condenser.
1—2500-kw. Westinghouse horizontal turbo unit, 3-phase, 60-cycle, 2300-volts, 1200 r.p.m., with direct connected exciter and complete with condensing equipment including motor driven air and circulating pumps.
1—500-kw. G. E. vertical turbo unit, 3-phase, 60-cycle, 2300-volts, 1800 r.p.m., with or without condensing equipment.
1—400-kw. Westinghouse, 3-phase, 60-cycle, 2200-volts, 3600 r.p.m. turbo unit.
1—330-kw. Stanley, 2300-v., 2-ph. or 3-ph., 60-cy., 164-r.p.m., alt. dir. ctd. to 20 x 32 Rice & Sargent engine.
1—200-kw. Cro. Wheeler 3-ph., 60-cy., 480-v. generator with 20 x 20 Skinner engine, 200 r.p.m.
1—125-kva. General Electric horizontal. 3 phase, 60-cycle, 440-volts, 3600 r.p.m.
1—100-kw. G. E. horizontal, 3-phase, 60-cycle, 2300, 440 or 220-volts, 3600 r.p.m., with or without condenser and pump.
1—75-kw. Westinghouse, 220-volts, 2 phase, 60-cycle alternator, direct connected to 12 x 14 Ball & Wood engine, 277 r.p.m.

ROTARY CONVERTERS

1—300-kw. Westg., 600-v., D.C., 3-ph., 60-cy., 370-v. A.C., 600-r.p.m.
1—200-kw. G. E., 3-phase, 25-cycle, 85-volts A.C., 125-volts D.C., 375 r.p.m.
1—200 kw. West. 3 ph. 60 cy., 370 v. A.C. 575 D.C., 720 r.p.m.
1—150-kw. Westinghouse, 2 or 3-phase, 185-volts A.C., 250-volts D.C., 720 r.p.m.

MOTOR GENERATOR SETS

1—108-kw. Cro.-Wheeler, type SECD. 36-v. generator, direct connected to 165-hp. Cro.-Wheeler, 230-v. motor, 500 r.p.m.
1—10-kw. Westinghouse, 125-volts, 1120 r.p.m. generator, coupled to 15-hp. Westinghouse, 2-phase, 60-cycle, 440-volt motor.

3-PH. 60-CY. MOTORS

1—300-hp. Gen. Elec., 440-volts, 450 r.p.m.
1—225-hp. G. E. Synchronous 220/440 v. 720 r.p.m.
2—200 hp. Westg. Sl. Rg., 2200 v., 580 r.p.m.
1—200 hp. Allis-Chalmers, 440-v. 580-r.p.m.
1—40 hp. Westinghouse, 440 volts, slip ring, 690 r.p.m.
9—35-hp. G. E., 440-volts, 900 r.p.m.
1—30 hp. Allis-Chalmers, 400 v. 865 r.p.m.
1—30-hp. Westinghouse 550 v. 840 r.p.m.
1—25-hp. Westinghouse, CS, 440-volts, 1160 r.p.m.
1—25-hp. G. E., 440-volts, 1200 r.p.m.
2—25-hp. G. E., 440-volts, 600 r.p.m.
3—25-hp. Westinghouse, CS, 440-volts, 865 r.p.m.

2-PH., 60-CY. MOTORS

1—50 hp. Allis Chal. 220 v. 865 r.p.m.
1—40-hp. Cro.-Wheeler, 220-volts, 685 r.p.m.
1—15-hp. G. E. 220-v. 1200-r.p.m.
1—10-hp. General Electric, 220 volts, 1200 r.p.m.
1—7½ hp. Westinghouse, 220 volts, 1130 r.p.m.
2—7½ hp. West. Elec. 220-v. 1200 r.p.m.

TRANSFORMERS—25-CY.

3—200-kva. West., 16,500-v. prim., 460 secy.
3—185-kva. G. E., 2300-volt prim., 430 volts.
3—125-kw. Westinghouse, 6600-volt prim., 440-volts.

3-PH., 25-CY. MOTORS

1—200-hp. Westinghouse, 440-volts, 480 r.p.m.
1—200-hp. Westinghouse, 400-volt, 365 r.p.m.
1—50 hp. Allis-Chalmers, 440-v. 720 r.p.m.
1—40 hp. Gen. Elec. 220 v. 750 r.p.m.
1—30 hp. Gen. Elec. 220 v. 750 r.p.m.
2—25-hp. Westg., CS, 440-v., 750 r.p.m.
13—20-hp. Westg., CS, 440-v., 750 r.p.m.

TRANSFORMERS—60-CY.

3—2000-k.v.a. G. E. type H. 66,000 V. Prim., 6600—13,200/22,000 V. Y Secy.
3—2000 k.v.a. G. E. 66,000 V. Prim. 2200/4000 Y. Secy.
2—1250-kva., 3-phase G. E., 26400/13200 prim. 2400/2200-volts secy.
4—750-kw. G. E. 44000/43000/42000 prim. 6600 secy.
3—300 k.v.a. Gen. Elec. 6600-6000 v. Prim. 2300-4000 v. Y. Secondary.
3—200-kva. G. E., 2200 prim., 370 secy. 440 secy.
3—150-kva. Bullock, 2180/2300/2120 prim. 440 secy.
4—150 kw. Allis-Chalmers, 33,000 primary, 2300 secondary.
6—110 kw. Gen. Elec. 14500-13050 v. Prim. 430-286-143 v. Sec.
2—100-kw. Westinghouse, 13200 prim., 375 secy.
3—100-kw. G. E., 9200 prim., 2300 secy.
3—100-kva. Westinghouse, 11,000 prim., 500 secy.
3—75-kva. G. E. 11,000/9900 vs. prim. 6600 secy.
3—75 kw. G. E. 2300 vs. prim. 370 secy.
2—50 kw. Westing. 5000/6600 vs. prim. 1000/1100/2000/2300 secy.
3—40 kva. Westinghouse, 6600 prim. 220/110 sec.
3—37½ kva. Westinghouse, 6600 prim. 440/220 sec.

ELECTRICAL-&-STEAM-MACHINERY

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Receivers
Ingersoll-Rand Co.

Air Aftercoolers
Ingersoll-Rand Co.

Ammeters
Weston Elec'l Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Westinghouse Elec. & M. Co.

Angle Bars
Lackawanna Steel Co.

Anti-Climbers
Railway Improvement Co.

Ash Storage Tanks, Cast Iron
Green Engineering Company

Automobile and Buses
Brill Co., The J. G.
White Co., The

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Midvale Steel & Ordnance Co.
Standard Steel Works Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
American Railway Supply Co.
Electric Service Supplies Co.
International Register Co., The

Bankers & Brokers
Coal & Iron National Bank

Batteries, Dry
Johns-Manville Co., H. W.
National Carbon Co.

Batteries, Storage
Electric Storage Battery Co.
National Carbon Co.

Bearings, Roller and Ball
Gurney Ball-Bearing Co.
Railway Roller Bearing Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
Post & Co., Inc., E. L.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.
Reading Specialties Co.
Watson-Stillman Co.
Zelnicker, Walter A., Supply Co. Inc.

Boiler Cleaning Compounds
Johns-Manville Co., H. W.

Boiler Coverings
Johns-Manville Co., H. W.

Boilers
Babcock & Wilcox Co.

Boiler Tubes
National Tube Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.
Roller Smith Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co.

Book Publishers
McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Boxes—Junction and Outlet
National Metal Molding Co.

Brackets and Cross Arms, (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Creaghead Eng. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
Gould Coupler Co.
National Railway Appliance Co.
Smith-Ward Brake Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.

Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Taylor Electric Truck Co.
Westinghouse Traction Brake Co.

Bricks, Fire
Green Engineering Co.

Bridges and Buildings
American Bridge Co.

Brooms, Track, Steel and Rattan
Paxson Co., J. W.

Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Morganite Brush Co.
United States Graphite Co.
Westinghouse Elec. & M. Co.

Brushes, Graphite
United States Graphite Co.

Brushes, Motor and Generator
National Carbon Co.

Brushes, Starting and Lighting
National Carbon Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Buckets
Blaw-Knox Co.

Bunkers, Coal
American Bridge Co.

Burners, Powdered Coal
Quigley Furnace Specialties Co.

Bushings, Case Hardened & Manganese
Bemis Car Truck Co.
National Metal Molding Co.

Bushings, Graphite & Wooden
Bound Brook Oilless Bearing Co.

Cables. (See Wires and Cables)

Carbon Brushes. (See Brushes, Carbon)

Carbons, Photographic and Projector
National Carbon Co.

Car Painting
Abel, G. T.

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
Midvale Steel & Ordnance Co.
National Railway Appliance Co.
National Safety Car & Equipment Co.
Osgood Bradley Car Co.
Thomas, Perley A.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.
Wendell & MacDuffie

Car, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Funnel
Wharton, Jr. & Co., Inc., Wm.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.
Wharton, Jr. & Co., Inc., Wm.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Earll, Chas. I.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Caustic Soda Cells
National Carbon Co.

Ceiling, Car
Keyes Products Co.
Pantasote Co.

Cement, Furnace
Quigley Furnace Specialties Co.

Change Carriers
McGill Metal Products Co.

Checks, Employees'
American Railway Supply Co.

Circuit Breakers
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Klein & Sons, Matthias
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers Track—(See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Cleats
National Metal Molding Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling—(See Conveying and Hoisting Machinery)

Coasting Recorders
Railway Improvement Co.

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Diamond Mfg. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Diamond Mfg. Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.
Sattley Coin Handling Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Mica Insulator Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
Chicago Pneumatic Tool Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. B. Co

Compressors, Gas
Ingersoll-Rand Co.

Concrete Mixers
Blaw-Knox Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.
National Metal Molding Co.

Conduits, Flexible
Tubular Woven Fabric Co.

Conduits, Underground
Johns-Manville Co., H. W.
Standard Underground Cable Co.

Connectors, Solderless
Dossert & Co.
Frankel Connector Co.
Westinghouse Elec. & Mfg. Co.

Controller Fingers
Eureka Co.
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Johns-Manville Co., H. W.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Electric Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
Portable Machinery Co

Conveyors, Coal & Ash
Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Conveying and Hoisting Machinery
American Bridge Co.
Columbia M. W. & M. I. Co
Green Engrg. Co.

Copper, Expansion Joints
Wheeler Mfg. Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
Van Dorn Coupler Co.
Westinghouse Trac. B. Co.

-for Precision in Test Work

Weston
Model 370

Portable Precision Electrodynamometer

Ammeters and Milliammeters

possess all of the refinements of design and construction required in the ideal Instrument.

These Instruments are effectively shielded and damped and are provided with mirror scales and knife-edge pointers.

Having an accuracy within ¼ of 1 per cent of full scale value they are suitable as working standards as well as for refined testing on either direct or alternating currents.

The Ammeter is provided with a double range. The Milliammeter has a single range only.

Model 370 Portable Precision Electrodynamometer A.C.-D.C. Ammeter

Complete information is contained in Bulletin 2003, sent upon request.

Weston Electrical Instrument Co.
21 Weston Ave., Newark, N. J.

New York
Chicago
Philadelphia
Boston
Cleveland
Detroit
St. Louis
San Francisco
Denver
Cincinnati
Pittsburgh
Richmond
Buffalo
Minneapolis
New Orleans
Jacksonville
Seattle
Toronto
Montreal
Halifax
Winnipeg
Vancouver
Calgary, Alta.

And in Principal Cities Throughout the World

WHAT AND WHERE TO BUY

Cranes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.
Thew Automatic Shovel Co.
Toledo Bridge & Crane Co., The

Creosoting. (See Wood Preservatives)

Cross Arms. (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossings, Frogs and Switches
Wharton, Jr. & Co., Inc., Wm.

Crossing Signals. (See Signals, Crossing)

Crossings, Track. (See Track, Special Work)

Crushers, Rock
Allis-Chalmers Mfg. Co.

Culverts
Armco Iron Culverts & Flume Mfg. Co.

Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Supplies Co.
Pantasote Co.

Cutouts
Chicago Fuse Mfg. Co.

Dealers' Machinery
Archer & Baldwin
Cleveland Armature Wks.
Electric Equipment Co.
Foster Co., L. B.
Griswold Machine Co., Geo. M.
Hyman Michaels Co.
Zelnicker Supply Co., Inc., Walter A.

Derailing Devices. (See also Track Work)
Cleveland Frog & Crossing Co.

Destination Signs
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors, Asbestos
Johns-Manville Co., H. W.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging. (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Chicago Pneumatic Tool Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Drinking Cups, Sanitary Paper
Individual Drinking Cup Co., Inc.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Walter A., Inc.

Electrical Wires and Cables
Roebling's Sons Co., J. A.

Electrodes
National Carbon Co.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Clark Management Corp., E. W.
Drum & Co., A. L.
Engel & Hevener
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter
Jacobs & Co., J. L.
Jurney, Oscor Co.
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Sargent & Lundy
Scofield Engineering Co.
Stone & Webster

Engines, Gas, Oil and Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co

Exhaust Fittings (including—Expansion Joints, Atmospheric relief valves and low pressure gate valves)
Wheeler Mfg. Co., C. W.

Expansion Joints, Track
Wharton, Jr. & Co., Inc., Wm.

Fabricated Steel
Blaw-Knox Co.

Fare Boxes
Brill Co., The J. G.
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.
Ohmer Fare Register Co.

Feed Water Heating
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.
Star Brass Works.

Fibre and Fibre Tubing
Continental Fibre Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.

Field Coils. (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
Castle Inc., James M
Johns-Manville Co., H. W.

Fire-Proofing Materials
Johns-Manville Co., H. W.

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National Carbon Co.

Flaxlinum Insulation
National Railway Appliance Co.

Floodlights
Electric Service Supplies Co.

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American Mason Safety Tread Co.
Johns-Manville Co., H. W.

Flooring, Grating
Irving Iron Wks.

Forgings
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track. (See Track Work)

Furnace Facing and Lining
Quigley Furnace Specialties Co.

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Columbia M. W. & M. I. Co.
Economy Fuse Mfg. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Johns-Manville Co., H. W.
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Carnegie Steel Co.
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Thayer & Co.
Westinghouse Elec. & Mfg. Co.

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Ackley Brake & Supply Corp.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

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English Electric Co., Ltd.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gongs. (See Bells and Gongs)

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Morganite Brush Co.

Grates, Chain
Green Eng. Co.

Greases. (See Lubricants)

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Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
Railway Track-work Co.

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Railway Track-work Co.

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American Bridge Co.

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Guy Anchors
Crouse-Hinds Co.

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Anderson M. Co., A. & J. M.
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Hensley Trolley & Mfg. Co.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works

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Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

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Pantasote Co.

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Consolidated Car Heating Co.
Gold Car Heating & Lighting Co
National Railway Appliance Co
Smith Heater Co., Peter

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

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Ford-Chain Block Co.
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Toledo Bridge & Crane Co., The
Yale & Towne Mfg. Co.

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Ingersoll-Rand Co.
Johns-Manville Co., H. W.

Hose, Bridges
Ohio Brass Co.

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International Exposition of Industries

Injectors
Schutte & Koerting Co.

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Electrical Testing Lab's

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Alexander Hamilton Institute

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General Electric Co.
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Roller Smith Co.
Thompson-Levering Co.
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Weston Elec'l Instrument Co.

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Mica Insulator Co.
Okonite Co., The
Standard Underground Cable Co.
U. S. Rubber Co.
Westinghouse Elec. & Mfg. Co.

Insulating Machinery
American Insulating Machinery Co.

Insulation. (See also Paints)
Anderson M. Co., A. & J. M.
Drew Electric & Mfg. Co.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Mitchell-Rand Mfg. Co.
Okonite Co., The
U. S. Rubber Co.
Westinghouse Elec. & Mfg. Co.

Insulators. (See also Line Material)
Anderson M. Co., A. & J. M.
Creaghead Engineering Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Jeffery-DeWitt Insulator Co.
Johns-Manville Co., H. W.
Locke Insulator Mfg. Co.
Macallen Co., The
Ohio Brass Co.
Pittsburgh High Voltage Insulator Co.
Thomas & Son Co.
Westinghouse Elec. & Mfg. Co.
White Electrical Supply Co.

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Electric Service Supplies Co.
Hubbard & Co.

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Buda Co.
Columbia M. W. & M. I. Co.
Duff Mfg. Co.
National Ry. Appliance Co.
Templeton, Kenly Co., Ltd.
Watson-Stillman Co.

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Carnegie Steel Co
Reading Specialties Co.
Zelnicker Supply Company, Inc., Walter A.

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Brill Co., J. G.
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Standard Underground Cable Co.

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Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

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General Electric Co.
National Elec. Specialty Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Ohio Brass Co.

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McCabe Lathe & Machinery Co.
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co.

Lightning Protection
Anderson M. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material. (See also Brackets, Insulators, Wires, etc.)
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Archbold Brady Co.
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Dossert & Co.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
English Electric Co., Ltd.
Eureka Co.
Flood City Mfg. Co.
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Johns-Manville Co., H. W.
Locke Insulator Mfg. Co.
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Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.
White Electrical Supply Co.

Loaders, Wagon, Truck or Car
Portable Machinery Co.

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General Electric Co.
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Westinghouse Elec. & Mfg. Co.

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Texas Co., The
Universal Lubricating Co.

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Borne, Scrymser Co.
Galena-Signal Oil Co.
Horrocks Desk Co.
Texas Co., The
Universal Lubricating Co.

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Niles-Bement-Pond Co.
Watson-Stillman Co.

Manganese Steel, Special Track Work
Wharton, Jr. & Co., Inc., Wm.

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>
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Mica Insulator Co.

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National Metal Molding Co.

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Johns-Manville Co., H. W.

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Ohio Brass Co.

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Columbia M. W. & M. I. Co.
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General Electric Co.
Wood Co., Chas. N.

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Ohio Brass Co.
Westinghouse Traction Brake Co.

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National Tube Co.

Pipe Fittings
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Standard Steel Works Co.
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Westinghouse Traction Brake Co.

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Drew Elec. & Mfg. Co.

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Southern Cypress Mfrs. Assn.

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Page & Hill Co.

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National Tube Co.
Nuttall Co., R. D.

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Lackawanna Steel Co.

Railway Safety Switches
Westinghouse Elec. & Mfg. Co.

Rail Welding. (See Welding Processes

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Foster & Co., L. B.
Zelnicker, Walter A., Supply Co. Inc.

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Carnegie Co.

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Brill Co., The J. G.
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Arthur Power-Saving Recorder Co.

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Electric Service Supplies Co.
International Register Co., The
Ohmer Fare Register Co.
Rooke Automatic Register Co.

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General Electric Co.
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Resistance, Wire and Tube
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Westinghouse Elec. & Mfg. Co.

Retrievers, Trolley. See Catchers and Retrievers, Trolley)

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American Car & Foundry

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St. Louis Car Co.

Sash Fixtures, Car
Brill Co., The J. G

Scrapers, Track. (See Cleaners and Scrapers, Track)

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Hale & Kilburn Corp.
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Shovels, Power
Brill Co., The J. G.
Thew Automatic Shovel Co.

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Consolidated Car Heating Co.
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National Pneumatic Co., Inc.

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Electric Service Supplies Co.
Nachod Signal Co., Inc.
Union Switch & Signal Co.
U. S. Electric Signal Co.
Wood Co., Chas. N.

Signal Systems, Highway Crossing
Nachod Signal Co., Inc.
U. S. Electric Signal Co.

Slack Adjusters, (See Brake Adjusters)

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Nuttall Co., R. D.

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McGuire-Cummings Mfg. Co.

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Frankel Connector Co.

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American Steel & Wire Co.

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U. S. Rubber Co.
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Schutte & Koerting Co.

Springs, Car and Truck
American Steel Foundries
American Steel & Wire Co.
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Brill Co., The J. G.
Standard Steel Works Co.
Taylor Electric Truck Co.

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Brill Co., The J. G.
McGuire-Cummings Mfg. Co.
St. Louis Car Co.

Steps, Car
American Mason Safety Tread Co.
Irving Iron Works
Universal Safety Tread Co.

Steps, Ladder and Stair (non-slipping)
Irving Iron Wks.

Steps, Safety
Irving Iron Wks.

Stokers, Mechanical
Babcock & Wilcox Co.
Green Engrg. Co.
Westinghouse Elec & Mfg. Co

Storage Batteries. (See Batteries, Storage)

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Copper Clad Steel Co.
Roebling's Sons Co., J A.

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Railway Improvement Co.

Structural Steel
Lackawanna Steel Co.

Subway Grating
Irving Iron Wks.

Superheaters
Babcock & Wilcox Co.
Power Specialty Co.

Surface, Set & Barometric Condensers
Wheeler Mfg. Co., C. H.

Sweepers, Snow. (See Snow Plows, Sweepers and Brooms)

Switch Boxes
Chicago Fuse Mfg. Co.

Switch Stands
Indianapolis Switch & Frog Co.
Ramapo Iron Works

Switches, Track. (See Track, Special Work)

Switches and Signals
Cheatham lec. Switching Devices Co.

Switches and Switchboards
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Synchroscopes
Weston Elec'l Instrument Co.

Tampers, Tie
Ingersoll-Rand Co.

Tanks, Ash and Coal Storage
Green Engineering Co.

Tanks, Oil Storage
Milwaukee Tank Works

Tapes and Cloths. (See Insulating Cloth, Paper and Tape)

Telephones and Parts
Electric Service Supplies Co.

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Elec'l Testing Laboratories

Terminals, Cable
Standard Underground Cable Co.

Testing Instruments. (See Instruments, Electrical Measuring. Testing, etc.)

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Railway Utility Co.
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Globe Ticket Co.

Tie Plates
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Dayton Mechanical Tie Co.

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American Bridge Co.
Barbour-Stockwell Co.
Carnegie Steel Co.
International Steel Tie Co.

Ties, Wood Cross. (See Poles, Ties, Posts, etc.)

Tongue Switches
Wharton, Jr. & Co., Inc., Wm.

Tool Holders
Williams & Co., J. H.

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Carnegie Steel Co.

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Advance Tool & Mfg. Co.
American Steel & Wire Co.
Chicago Pneumatic Tool Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Hubbard & Co.
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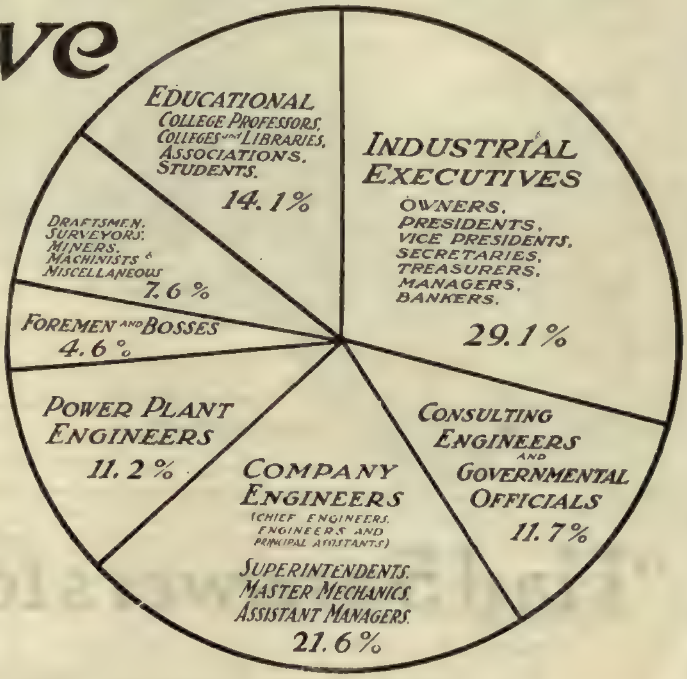

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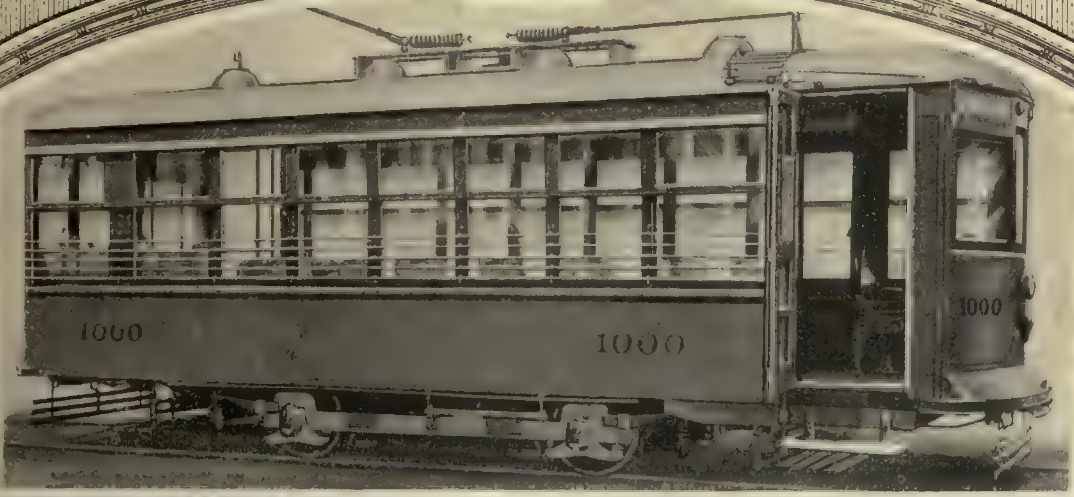

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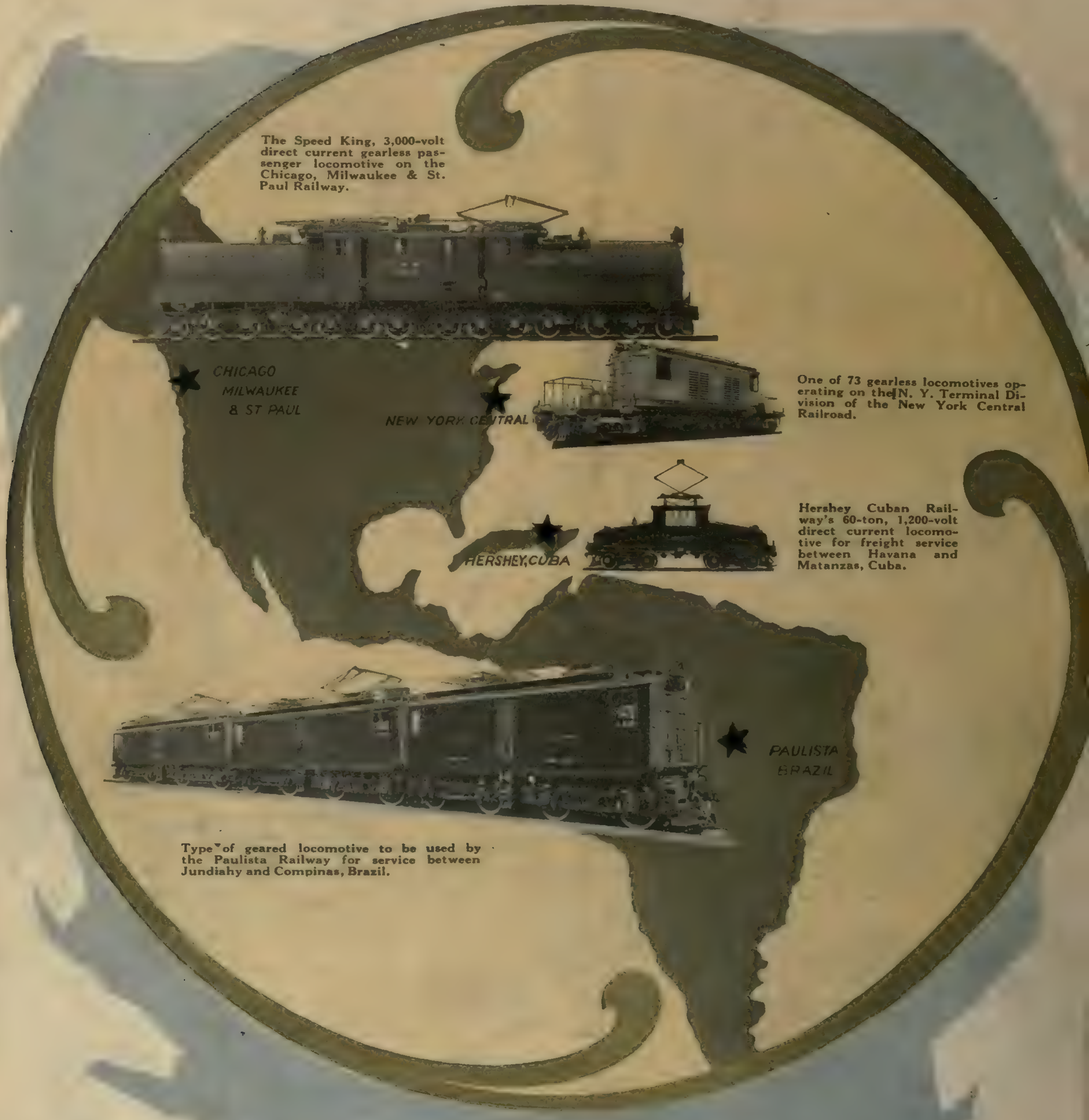

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Vol. 56, *No.* 16 New York, October 16, 1920 *Pages* 745-854

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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Change of Address—when change of address is ordered the new and the old address must be given. Notice must be received at least ten days before the change takes place.

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Circulation of this issue, 6,400 copies

Advertising Indexes—Alphabetical, 110; Classified, 144, 146, 148; Searchlight Section, 99-103

Two of the new 250 Safety Cars recently purchased by the Eastern Massachusetts (Bay State) Street Ry., all of which carry "Bungalow" air compressors.

"Bungalow" Type Air Compressor

250 "Bungalow" air compressors selected by Largest Electric Railway Line

All the largest orders for Safety Cars include the "Bungalow" air compressor —Brooklyn, 200; Eastern Massachusetts, 250; Public Service Corpoation of New Jersey, 200. The highly satisfactory service rendered by this dependable machine resulted in its selection.

Its light weight, low build, compact and rugged form—and above all, its absolute dependability, recommends the "Bungalow" to exacting electric railway service.

Not only the large systems select the "Bungalow," but many smaller ones as well. The "Bungalow" is installed on 3306 Safety Cars operating on 185 different electric railways in the United States.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

New York
San Francisco

Washington

Chicago
St. Louis

Safety Cars will speed up the life of your town, too!

No live electric railway can afford to decrease its usefulness to the community because—

The riding index (rides per inhabitant per annum) is the gage of the social and welfare life of the town.

The Safety Car is the one way you can boost your town while boosting your net.

Birmingham's boom of 25 to 30% is characteristic of correct safety car operation which means:

The inauguration of more car miles at less cost, higher speed and greater safety through your use of genuine Safety Car equipment.

It is not a safety car unless it is equipped with automatic laborless apparatus, so interlocked that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sand apply immediately thereafter and the doors unlock for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed before the car can start, and when the air brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

One-Man Cars Increase Traffic.—One-man safety cars are proving popular in Birmingham, Ala. Twenty-five of these cars are now in service on three of the lines of the Birmingham Railway, Light & Power Company. It is estimated that on the Lakeview and Highland lines, where "safeties" are being operated, traffic has increased from 25 per cent to 30 per cent. Many persons not heretofore patronizing these lines are reported to be doing so since the introduction of the one-man cars.

SAFETY CAR DEVICES COMPANY

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

Phono-Electric

at an important Tacoma Junction

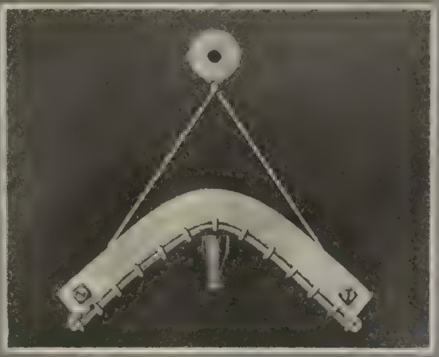
This location in front of the Post Office at Tacoma was one of the great intersections during war times, for it was here that the masses of shipyard workers transferred to the Municipal Railway.

Through the use of Phono-Electric Trolley Wire at this and other busy points, there was assured a higher reliability of power supply service than would have been possible if dependence had been placed on copper.

PHONO-ELECTRIC is as Reliable in Peace as in War.

Bridgeport Brass Company
Bridgeport Connecticut

2337



National Trolley Guard
(Patented)
An inverted trough of open wire mesh. When the wheel leaves the wire it runs on the live guard and carries car and cargo to safety.

How many times have you paid for National Trolley Guard?

The other day a western property paid for National Trolley Guard for all its grade crossings.

The tragedy is they haven't a foot of it on the road.

The trolley wheel jumped on a grade crossing. The retriever retrieved.

The conductor—green—couldn't release the rope. He warned the passengers just before the train arrived. The wreckers raked up the car.

Buy National Guard and get it—before you pay for it anyway.

Send for "Guarding the Grade Crossings."

The Ohio Brass Company
MANSFIELD, OHIO

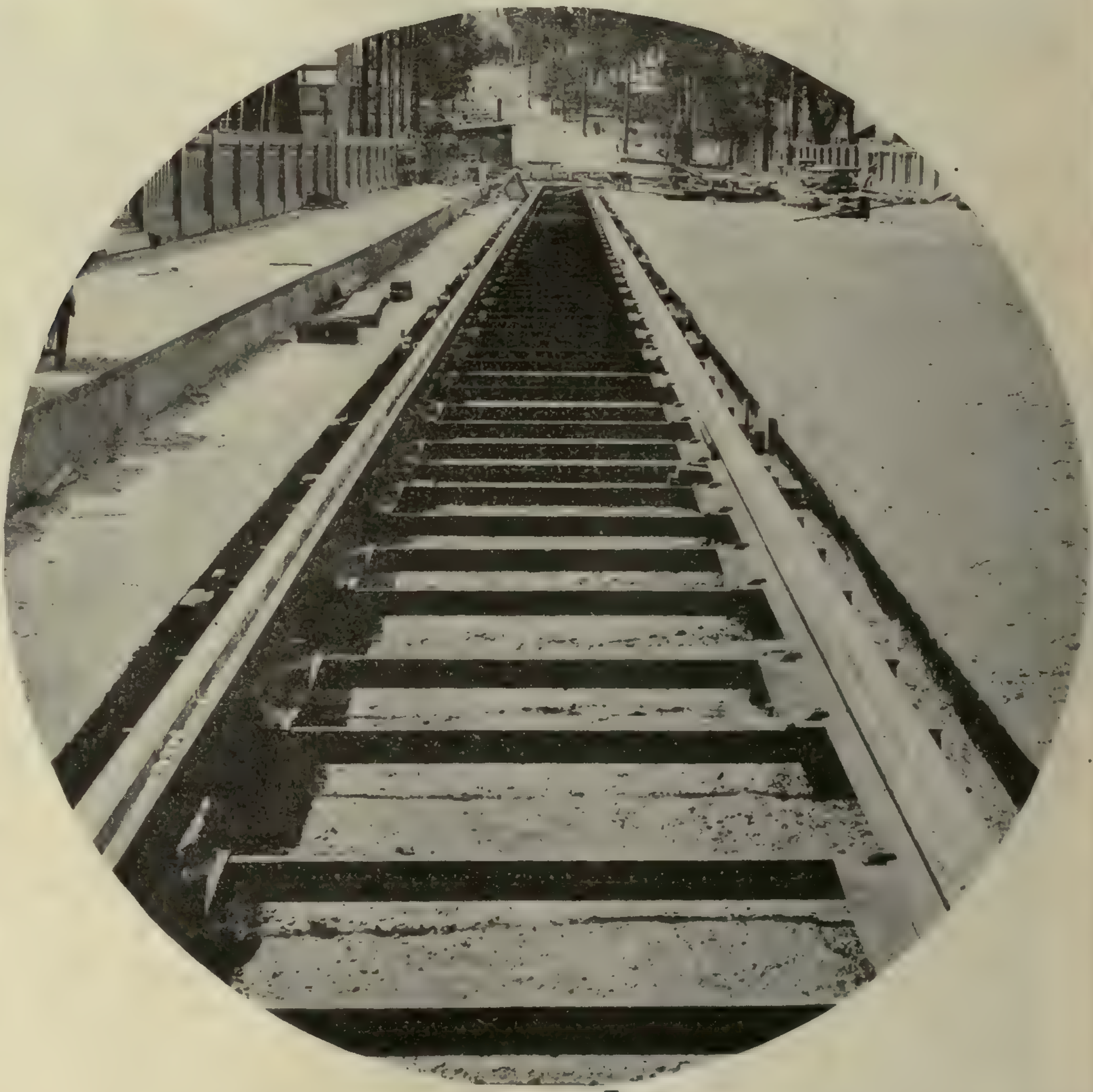
New York · Philadelphia Pittsburgh Chicago
San Francisco Los Angeles Paris, France

Manufactures: Trolley Material, Rail Bonds, Car Equipment, High-Tension Porcelain Insulators, Third Rail Insulators

INTERN

Steel Twin Tie Track—

To Put It Briefly



Steel Twin Ties cost 16 cents more per foot than wood ties—

BUT

$0.28 per foot is saved in excavation.

$1.95 per foot is saved in concrete—

$0.66 per foot is saved by eliminating unnecessary supplies—

Total saving of material with Steel Twin Ties, $2.73 per foot—

Track gauging unnecessary with Steel Twin Ties—

50% labor saved—

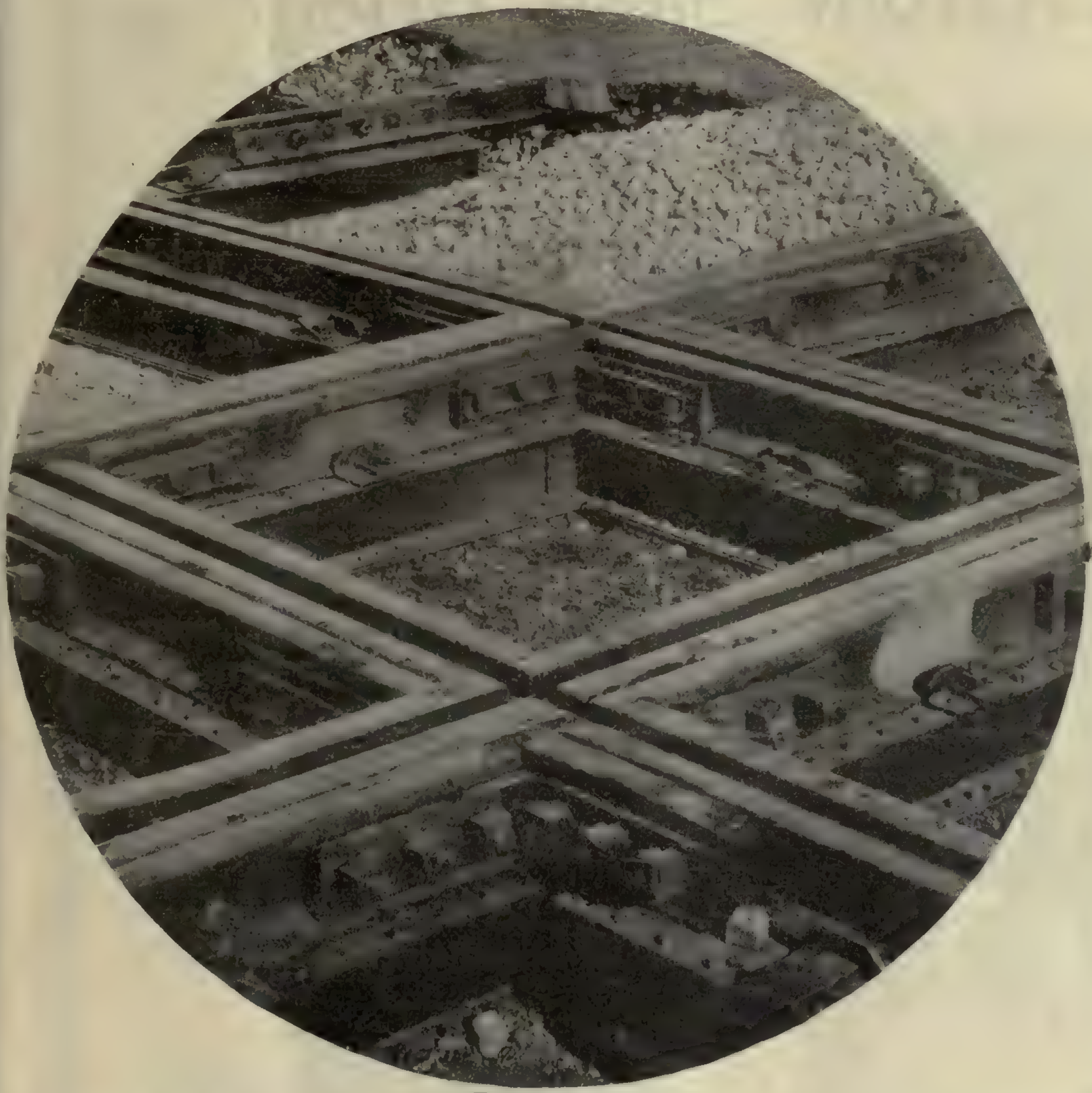
Large maintenance saving!

Write for
and Full

THE INTERNATIONAL
Manufacturers of Steel Twin
GENERAL SALES OFFICE AND

ATIONAL

Steel Crossing Foundations



To Put It Briefly

When the heavy interurban — or the big freight —or the long procession of packed Safety Cars bump across the crossing—

What takes the shock?

If it's an International Steel Crossing Foundation—

a—7-in. by 14¾ pound Channels as side members riveted together with ¾-in. rivets and ⅜-in. top and 5/16-in. bottom plates.

b—creosoted wood blocks with the grain vertical.

c—A "shock absorbing area" or bearing surface one and one half times more than wood ties give you!

No wonder so many roads use them!!

Catalog Particulars

STEEL TIE COMPANY
Ties and Crossing Foundations
WORKS: CLEVELAND, OHIO

You get real dry sand with minimum fuel when you use the

Keystone Sand Drier

Keystone Sand Drier

It consists simply of a cast-iron heater surrounded by a sheet-iron hopper, which rests on a perforated ring. Wet sand is shoveled into the hopper against the heater, and as it dries runs out through the perforated ring at the bottom.

It dries the sand quickly and cheaply; uses no steam coils; is made to burn any kind of fuel; may be located and operated anywhere; it is the solution for your sand-drying problems.

Let us send you our booklet and give you quotations.

Write for complete data

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Canadian Distributors: Lyman and Supply Co., Ltd., Montreal, Toronto

SAFETY CARS ARE MOST EFFICIENT WHEN EQUIPPED - WITH - KEYSTONE SPECIALTIES

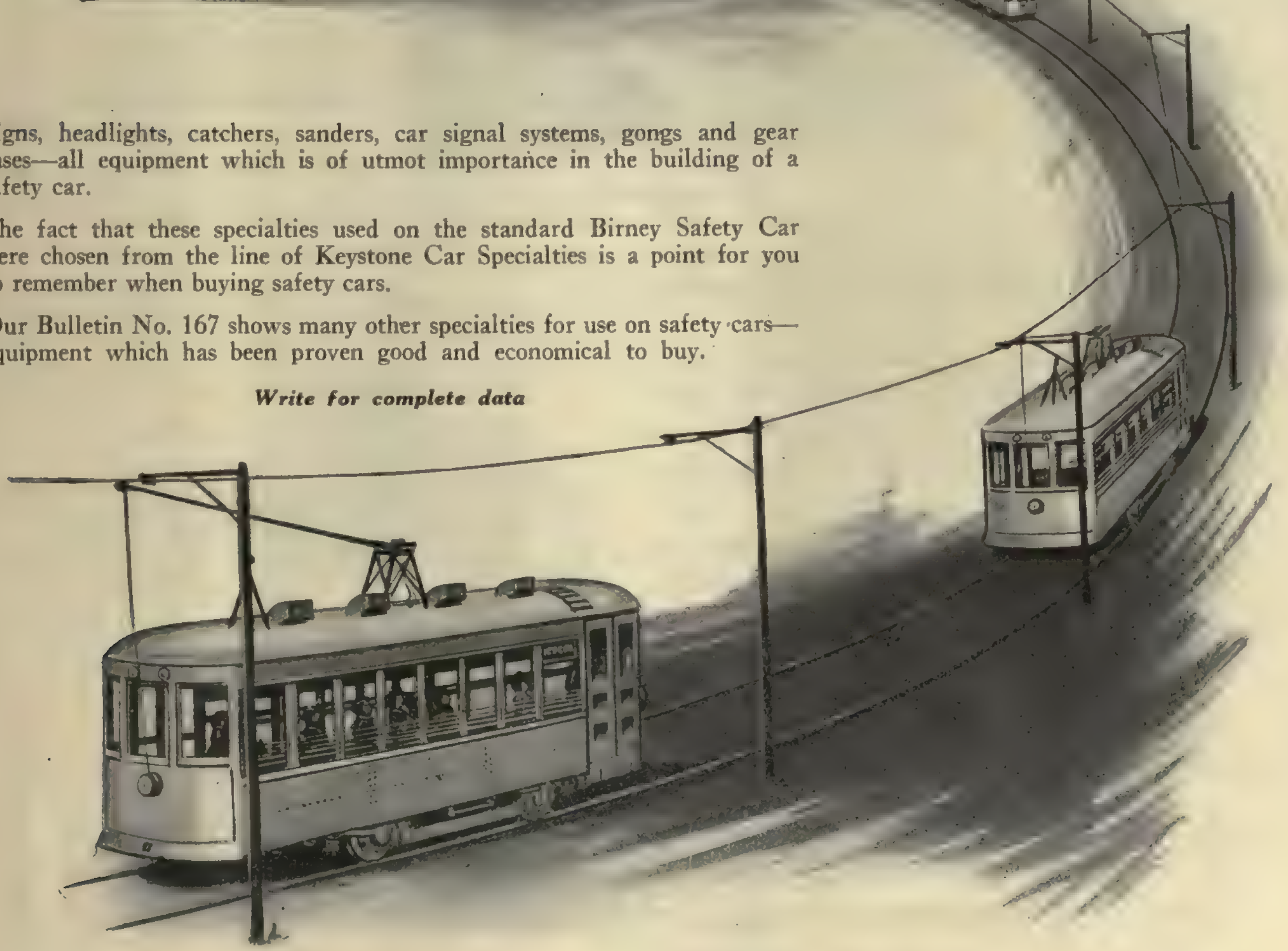
SPECIAL
KEYSTONE-HUNTER CAR SIGNS
GOLDEN GLOW HEADLIGHTS
KEYSTONE TROLLEY CATCHERS
KEYSTONE AIR SANDERS
FARADAY CAR SIGNAL SYSTEM
KEYSTONE ROTARY GONGS
KEYSTONE STEEL GEAR CASES

Signs, headlights, catchers, sanders, car signal systems, gongs and gear cases—all equipment which is of utmot importance in the building of a safety car.

The fact that these specialties used on the standard Birney Safety Car were chosen from the line of Keystone Car Specialties is a point for you to remember when buying safety cars.

Our Bulletin No. 167 shows many other specialties for use on safety cars—equipment which has been proven good and economical to buy.

Write for complete data

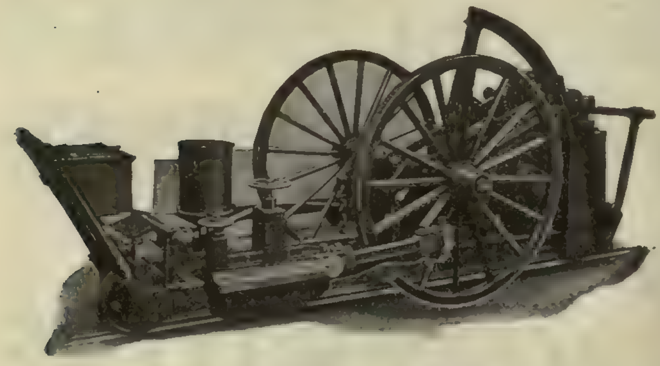


ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA: 17th and Cambria Streets NEW YORK: 50 Church St. CHICAGO: Monadnock Building
Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

Rotary or Reciprocating



Reciprocating Track Grinder

A Grinder for every need

What kind of a grinder do you need?

That depends entirely upon the condition of your track and the work being done or contemplated.

FOR removing rail corrugations and grinding new or slightly cupped joints and special work, the Reciprocating Track Grinder is easily the best. Through the planetary action of this grinder only the minimum of metal and consequent life is removed from the rail head in attaining a smooth tractive surface at least cost of operation.

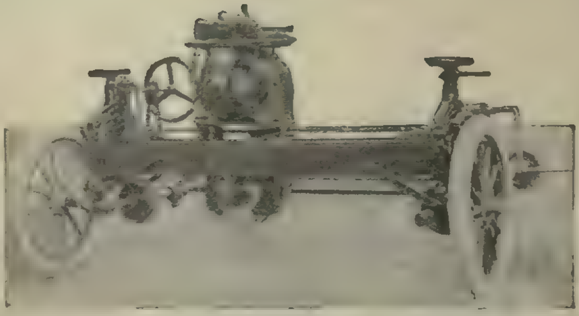
Atlas Rail Grinder

THE Atlas Rail Grinder employs the rotating grinding wheel method of operation and is used with good results for removing the surplus metal used to build up low joints by means of arc welding.

It is low in first cost. It is simple to operate, will last a life time and permit of high efficiency.

Universal Rotary Track Grinder

THE Universal Rotary Track Grinder is built along the lines of the Atlas Rail Grinder but has several additional features of advantage and improvement, justifying the slight additional first cost. Its advantages can be summed up as follows: Tilted grinding wheel; Outboard bearing on grinding wheel arbor for stability; Adjustable outrigger; Large Pneumatic derail wheels; Three point suspension of bronze bearing of grinding wheel arbor for stability of wheel; Simple adjustments; Ease of operation; Low working economy and upkeep.



Universal Rotary Track Grinder

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia, Pa.

EXCLUSIVE AGENTS:

ATLAS RAILWAY SUPPLY CO.
Chicago, Ill.

ELECTRICAL ENGINEERING & MANUFACTURING CO.
Pittsburgh, Pa.

CHAS. N. WOOD CO.
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc.
77A Queen Victoria St., E. C.
London, England

How Many Passengers Per Operative Per Hour Do You Carry?

Standardize! *Pneumatize!*

That's the real test of the PRODUCTION capacity of your equipment and your men.

Two men per car throughout the day means that your output per operative is going to be too costly for these days.

One man per car for all the base schedules and three men for two-car trains means that your output per man can be raised at least 50%.

PROVIDED that the cars are PNEUMATIZED to permit greater production with no manual effort and to INCREASE the schedule speed.

The Safety Car is your anwer for the one, and the National Pneumatic "Rushour" line for the other. You get the famous National Pneumatic Door Engine in either case.

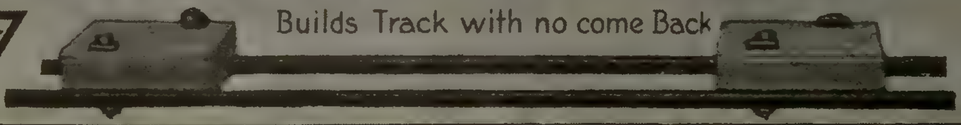
NATIONAL PNEUMATIC COMPANY
INC.

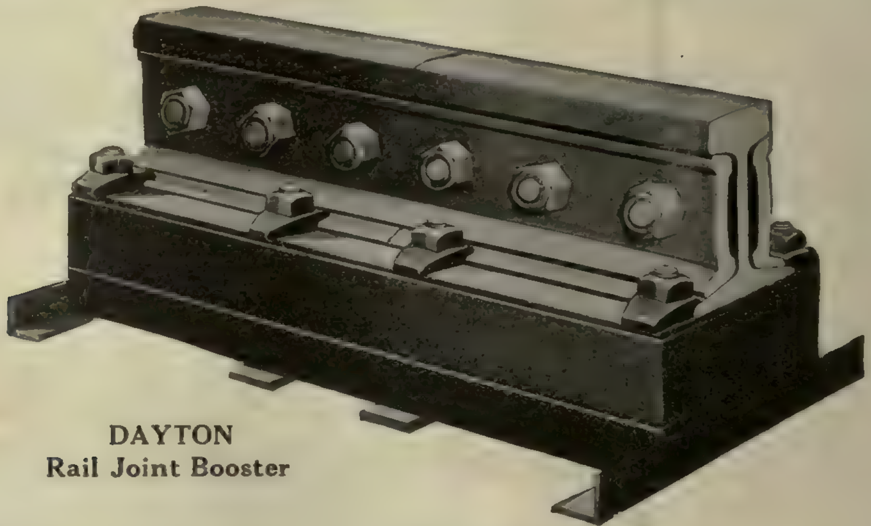
50 Church St., New York **Edison Bldg., Chicago**

Works: Rahway, N. J.

The RESILIENT RAILWAY TIE

Builds Track with no come Back





DAYTON
Rail Joint Booster

As the rubber heel acts as a buffer for the human body, so the asphalt cushion in the Resilient Railway Tie acts as a buffer for your track foundation, and your rolling stock. It absorbs the hammer blows, which unless dissipated destroys your track foundation, causes the paving to loosen and break, plays havoc with the rolling stock and shatters your patrons nerves. This shock absorber is found in the Resilient Railway Ties and Joint Boosters. A trial of the "Joint Booster" now on old track will convince you, what a new track with Resiliency applied throughout will be.

—the secret is Resiliency!

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

Out of the Way of Traffic—at a moment's notice, and back at work as soon as the car passes.

The ERICO Portable Bonding Apparatus does not grip the rail—simply rests upon it. To clear for traffic is simply to pick up and set aside.

ERICO signifies the highest development in bonds and bonding apparatus.

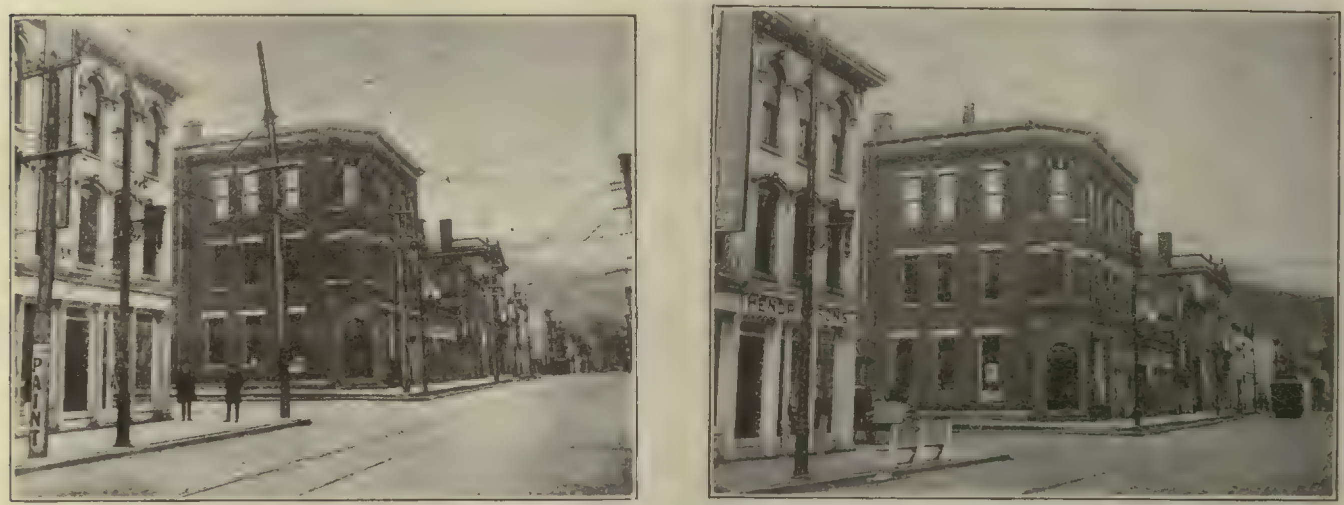
Welded bonds with a tenacious grip and a molecular contact, that show the highest grade in efficiency cost and lack of depreciation.

The rheostat part of the apparatus is moreover a first-class arc welding set, for track or shop welding wherever current is available.

Write for further details and prices.

The Electric Railway Improvement Co.

Cleveland, Ohio



Maysville, Kentucky, showing street scene before and after Elreco Combination Railway and Lighting Poles were installed.

Here is a splendid argument for increased fares

If the electric railway company favored the elimination of old heavily-laden wooden poles, and dilapidated span construction, it would be much easier to receive an unbiased hearing on a fare increase than if it assumed an arbitrary attitude when approached on the subject of overhead wiring conditions and new pole lines.

Let the Street Railway Company approach the Chamber of Commerce with a proposition to *share* in the expense of securing brilliant night illumination and eliminating the tangled web of wires from overhead on main thoroughfares—

—in other words, sell the idea of a "White Way" to your town or city.

—and sell it in the least expensive way, with "Elreco" Combination Railway and Lighting Poles.

Many big and small municipalities all over the country have endorsed this plan. Write for Catalog F containing numerous installation pictures.

Electric Railway Equipment Company
Cincinnati, Ohio
30 Church Street, New York City

They're always "on the job"

LITTLE GIANT Electric Track Drills are seldom seen idle: First, because users once realizing their indispensable utility, keep them busy. Second, because their sturdy, highly perfected construction resists wear and severe service even in the hands of unskilled operators.

Over 1200 Little Giants now in track drilling service are performing the work *ten to twelve times faster* than old-time hand methods at a saving of 85 to 90% in cost.

Put them on *your* Spring construction and repair work. Ask for bulletin.

Illustration shows Little Giant Track Drill on the Georgia Railway and Power Company property, Atlanta, Ga.

Chicago Pneumatic Tool Company

Chicago Pneumatic Building . 6 East 44th Street . New York

*Sales and *Service Branches all over the World*

EL 32

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BOYER PNEUMATIC HAMMERS · LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS
CHICAGO PNEUMATIC AIR COMPRESSORS · VACUUM PUMPS · PNEUMATIC HOISTS,
GIANT OIL AND GAS ENGINES · ROCK DRILLS · COAL DRILLS

LITTLE CHICAGO CP PNEUMATIC **GIANT**

Electric *Tools*

ANACONDA COPPER WIRE

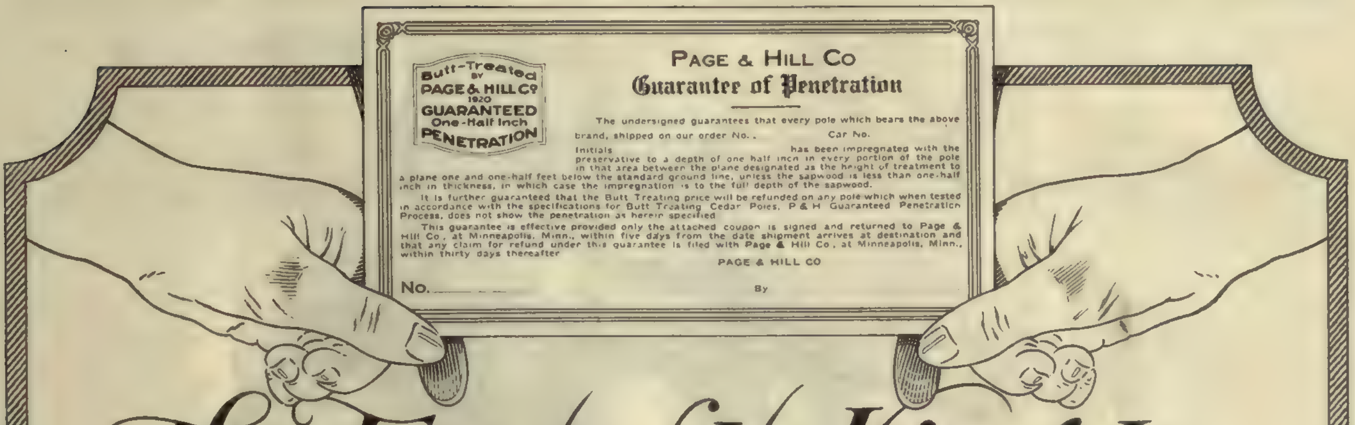
The inability to secure an adequate supply of raw material seriously hampers production in many industrial plants. Diminished output of manufactured products is the inevitable result of this condition as it exists today.

Anaconda, however, is particularly fortunate in this respect. By controlling its own supply of raw material and carrying out each manufacturing process under centralized supervision, output is enabled to keep pace with demand.

Today the slogan "From Ore to Finished Product" assumes a more important meaning to users of copper wire.

"From Ore to Finished Product"

Anaconda Copper Mining Company
Rolling Mills Department
Mills—Great Falls, Montana
General Office: 111 W. Washington St.
Chicago



PAGE & HILL CO
Guarantee of Penetration

The undersigned guarantees that every pole which bears the above brand, shipped on our order No. Car No. Initials has been impregnated with the preservative to a depth of one half inch in every portion of the pole in that area between the plane designated as the height of treatment to a plane one and one-half feet below the standard ground line, unless the sapwood is less than one-half inch in thickness, in which case the impregnation is to the full depth of the sapwood.

It is further guaranteed that the Butt Treating price will be refunded on any pole which when tested in accordance with the specifications for Butt Treating Cedar Poles, P & H Guaranteed Penetration Process, does not show the penetration as herein specified

This guarantee is effective provided only the attached coupon is signed and returned to Page & Hill Co., at Minneapolis, Minn., within five days from the date shipment arrives at destination and that any claim for refund under this guarantee is filed with Page & Hill Co., at Minneapolis, Minn., within thirty days thereafter

PAGE & HILL CO

No. ______ By

The First of Its Kind In the History of the Pole Industry

THE P & H Guaranteed penetration Process of Butt-Treatment is the first of its kind in the history of the pole industry that guarantees uniform penetration of the preservative throughout the groundline area of the pole.

With every shipment of poles butt-treated by this process the buyer receives a written guarantee. Page & Hill Co. guarantees without qualifications to refund the entire butt-treating price on every pole that does not show ½ inch uniform penetration.

Every pole buyer knows what a revolutionary departure this is from old methods, and what this guaranteed penetration process is going to mean in longer life for poles, in fewer replacements of poles, and in reduction of maintenance costs.

This guaranteed process, moreover, costs but little more in the first cost, and in the long run is far cheaper.

No other process guarantees a uniform penetration. Accept no other but the P & H Guaranteed Penetration Process.

Write for Particulars.

PAGE & HILL CO.
Minneapolis, Minn.

BRANCH OFFICES:

Times Bldg., New York, N. Y.
717 Bryant Bldg., Kansas City, Mo.
19 So. LaSalle, Chicago, Ill.
1111 Carter Bldg., Houston, Texas
311 Sumpter Bldg., Dallas, Texas
1416 Starks Bldg., Louisville, Ky.

Originators of the P & H Guaranteed Penetration Process. Producers, manufacturers, and foremost in the Butt-Treatment of Cedar Poles.

This disc countersunk on the butt-end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is your assurance of one-half inch penetration.

Old Dan McGrew of the Baltimore "U" sez, "Those old bonds will never do, they'll last a short while just like any new style, and when they break down they'll go out by the mile.

"For girder rail, there's nothing so frail as bonds that quickly work loose and fail, they're hard to repair, and they'll give you a scare if you figure the power loss you're bound to find there.

"For repairing a frog, a switch or a mate, an Indianapolis welder, if it isn't too late, for every cent spent will save you a dollar, and you can be sure that there won't be a holler.

"So Apex welded joints for mine, on girder rail they're simply fine, the cost per joint will end your doubt and you'll never again be without."

So when splice bars were down and the joints cupped and bent, for Apex joints the P.A. promptly sent.

And again and again Old Dan McGrew insists that the rails are now better than new.

The Greatest Aid of the Way Engineer

INDIANAPOLIS SWITCH & FROG COMPANY
SPRINGFIELD, OHIO

Ackley All-Steel No-Staff

Self-Contained

Compact

No Sprockets

Dependable

Powerful

No Chain Cutting

As reliable in release
as in application

For Both Light and Heavy Cars

ACKLEY
NO-STAFF
TRADE BRAKE MARK

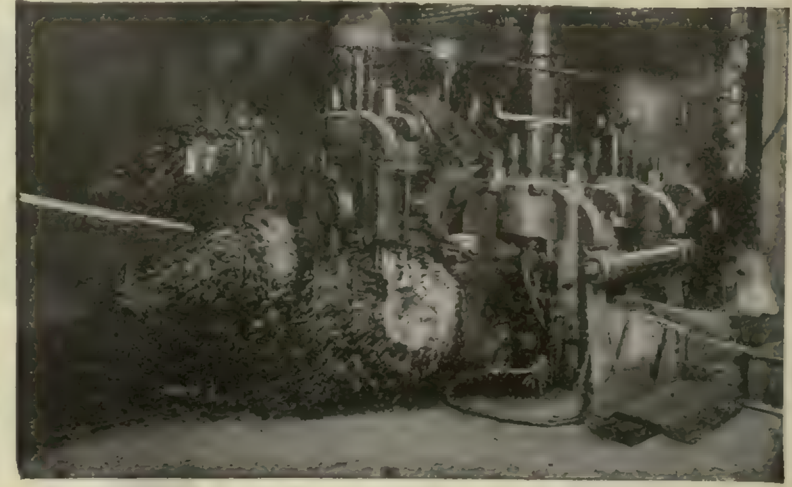
ACKLEY BRAKE & SUPPLY CORPORATION
G. S. ACKLEY & COMPANY. REPRESENTATIVES
50 Church Street, New York, U.S.A.
Agencies throughout the World
Cable address "Acklebrake"

ACKLEY
2-E
TRADE BRAKE MARK

Do you know the difference between deseamed rails and ordinary rails ?

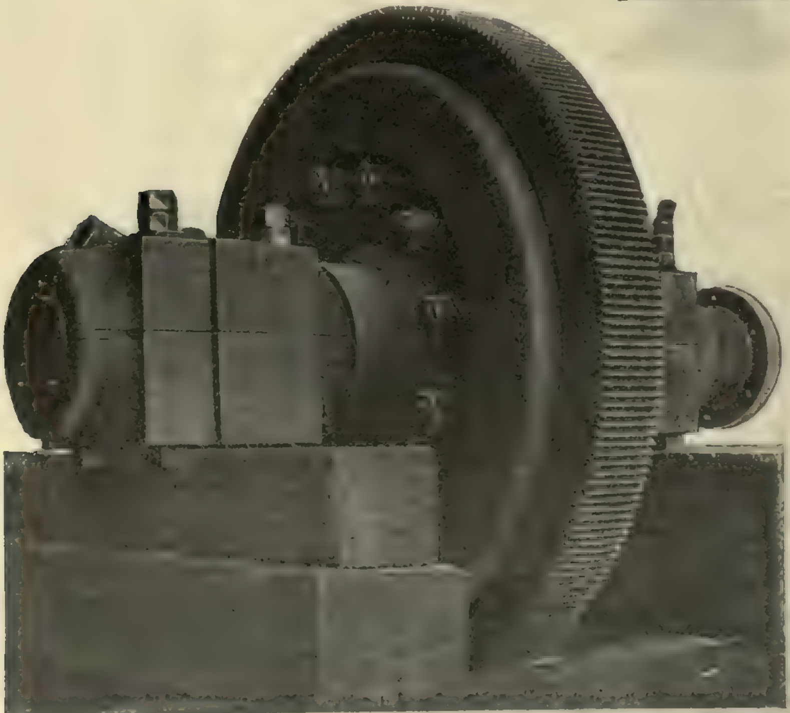
Note how the Lackawanna Deseaming Process eliminates weak surface metal, thereby increasing durability of rail head and preventing fracture in base—

Our previous two-page advertisements have made plain the necessity for removing the weak laminated partially decarburized metal at the head and base of rails, in order to secure a harder longer-lived running surface and a greater safety from cracking and fracture. This announcement will explain how the desired metal improvement is accomplished in the Lackawanna Deseaming Process.



The machine in which the deseaming operation is carried out. The long white line is the hot rail bar emerging from the finish rolls after being subjected to the action of the deseaming saws.

The machine by which the weak metal at the location of the rail head and base is removed subjects the hot rail bar on top and bottom surfaces to cutting action from teeth on two opposed rotating saw discs, just after the hot bar comes down the mill table from the last roughing pass. During this stage of travel a collar roll turns the rail bar so that its head is down and the base up. The bar then enters a tunnel about 20 feet long and lined with fire brick to check heat radiation. (See diagram on opposite page). It is then forced between the saw discs by a pair of driven pinch rolls, adjustable to bars of various sizes and having guides for the top, bottom and sides of the bar. Adjustment of the saws is made for a cut ⅛ inch or at the extreme 3/16 inch deep. A second set of driven pinch rolls, on the delivery side, helps to force the bar against the cut of the saw teeth and similarly a second set of guides here helps to hold the bar rigidly and firmly during passage through the saw. From the delivery set of pinch rolls the bar travels through about 40 feet more of tunnel similar to that on the entering side and then goes on its way at a speed of about 350 feet per minute, is slowed down by the cutting operation to about 79 feet per minute, and on leaving the saw rapidly picks up speed until it enters the finishing stand at about 500 feet per minute.

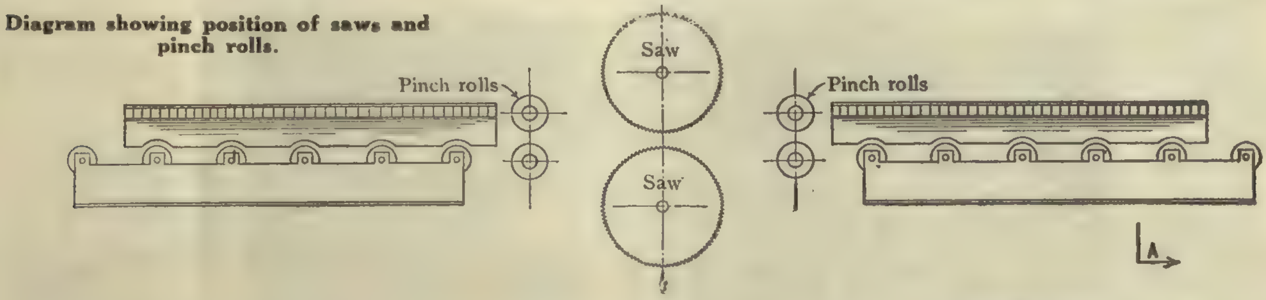


Upper saw disc taken from the machine.

The upper saw disc (operating on the base of the bar) has an 8-inch and the lower (operating on the head) a 6-inch face. Both are driven from belted motors, are 5 feet in dia-

ALL LACKAWANNA RAILS ARE DESEAMED

Diagram showing position of saws and pinch rolls.



meter, and run at a peripheral speed of 25,000 feet per minute, or, in other words, both discs together make 800,000 tooth contacts with the bar per minute. The capacity of the machine is 170 tons of rails per hour.

All Lackawanna Rails of 50 pounds per yard and heavier are now deseamed by this process, which in connection with high chemical purity makes the Lackawanna product unquestionably superior to any rails that have ever been offered.

Watch for other announcements, which will give interesting data on rail performance, and send for our book "The Lackawanna Deseaming Process."

Showing the position in which the partially finished rail bar travels between the saws, and the extent to which soft metal is removed at the head and base.

For Railroad Construction Work

Lackawanna

Sheet Steel Piling

Thousands of tons of Lackawanna Steel Sheet Piling are used by American Railroads for construction and permanent protection of bridge piers, temporary and permanent retaining walls, grade elimination work, etc.

Maintenance departments which keep a stock of Lackawanna Sheet Piling on hand as permanent equipment find this material an invaluable help in repairing washouts and for other emergency jobs. Lackawanna Sections are made in a wide range of types and sizes from which one can be selected for safety and economy under practically any conditions.

DOUBLE-LOCK
LACKAWANNA
INTERLOCK

The Lackawanna Flexible Interlock is not only superior in strength and water-tightness but permits obstructions in the piling line to be passed without undue deflection and is adapted to the construction of irregular walls and small circular enclosures.

Our Sheet Piling Engineers will gladly cooperate with railroad construction officials in determining the most desirable methods and sections for difficult work and will submit valuable cost data. Send for our book, "Lackawanna Steel Sheet Piling."

Elcannes

Concrete Reinforcing Bars

The broad and deep depressions at regular intervals in the bar surface take the place of excess and waste metal comprising the projections on ordinary types of deformed bars.

The bonding surface of the Elcannes Bar is 15 per cent greater than that of a plain square bar of the same nominal size.

The Elcannes Bar is uniformly designed, the deformations being so arranged on opposite sides of the bar that a practically unvarying cross-sectional area is maintained.

The regular surface and uniform section render handling easy and reduce the difficulty of fabrication or bending in shop or field. The Elcannes Bar is manufactured exclusively by the Lackawanna Steel Company. Send for complete information.

Lackawanna Steel Company

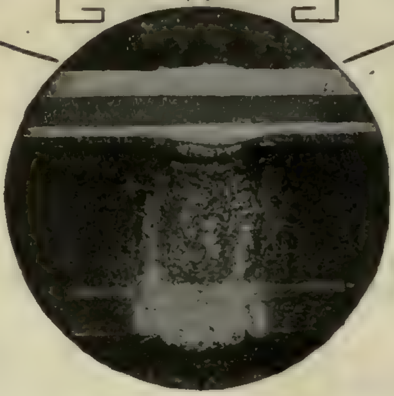
General Sales Office and Works: Lackawanna, N. Y.

Atlanta Boston Buffalo Chicago Cincinnati Cleveland Detroit New York Philadelphia St. Louis San Francisco

Sole Exporter of Our Commercial Products: Consolidated Steel Corporation, 165 Broadway, New York

TRAVELS TO TOWNS WHERE THERMIT INSERT RAIL WELDING TERMINATED TRACK TROUBLES

A Finished Thermit Insert Weld.



FORT WAYNE

In 1794 Gen. Anthony Wayne built a stockade fort for protection against the Indians, the site of which fort now bears his name.

Although the old protection is no longer necessary, the city track of Fort Wayne is receiving a new kind of protection.

By the recent order to install a considerable number of THERMIT INSERT WELDS in Fort Wayne, this section of track will shortly be protected against cupping and short life, because the rails are made continuous and there is no chance for the rail ends to work loose and pound.

Send for Pamphlet 1232

METAL & THERMIT CORPORATION
120 Broadway
Chicago
Pittsburgh
San Francisco
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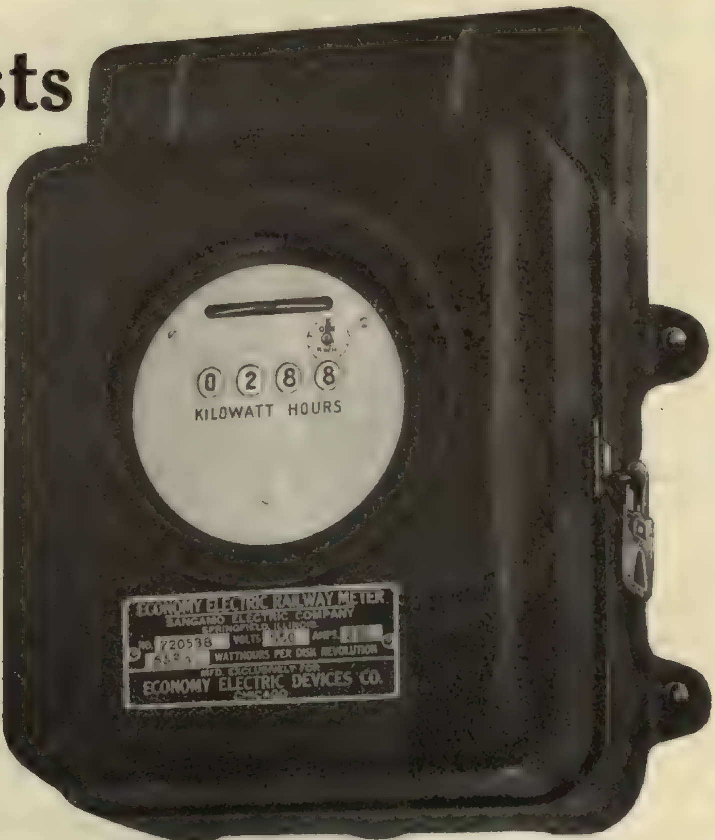
SERVICE STRENGTH THERMIT WELDING ECONOMY

Higher Coal Costs Demand Every Economy

Install Economy Car Meters *and* Reduce Your Coal Bill

Automatic Stokers, Modern Boilers, High Efficiency Turbines will lower your power generating costs.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KILOWATT HOURS
ECONOMY ELECTRIC RAILWAY METER
SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS
WATTHOURS PER DISK REVOLUTION
MFD. EXCLUSIVELY FOR
ECONOMY ELECTRIC DEVICES CO.

The Watch Dog of Your Coal Pile

But—

IF power is wasted by careless car operation, coal also is being wasted. It is necessary to stop the leaks at both ends. There is a direct connection between power consumption at the car and the coal pile at the power house. Every Kilowatt hour wasted at the car means so many pounds of coal wasted.

The ECONOMY METER, by indicating to the motor man the most economical method of operation, will stimulate him to avoid waste of power on his car without sacrificing safety or schedule.

No matter what method of training a motorman is given, whether he is coached to reduce his power-on time, to increase his coasting time, to decrease his braking time—or all three—if he improves his car operating efficiency the ECONOMY METER will credit him with a true record of the power he saves.

The Watchdog of Your Coal Pile

ECONOMY POWER SAVING METERS, by recording the Kilowatt hours consumed, show both the motorman and the management the individual "Power Bills." Thus they get down to the very fundamentals of energy checking and saving.

In addition, individual car energy records afford data of high engineering value and a convenient basis on which to inspect car equipment.

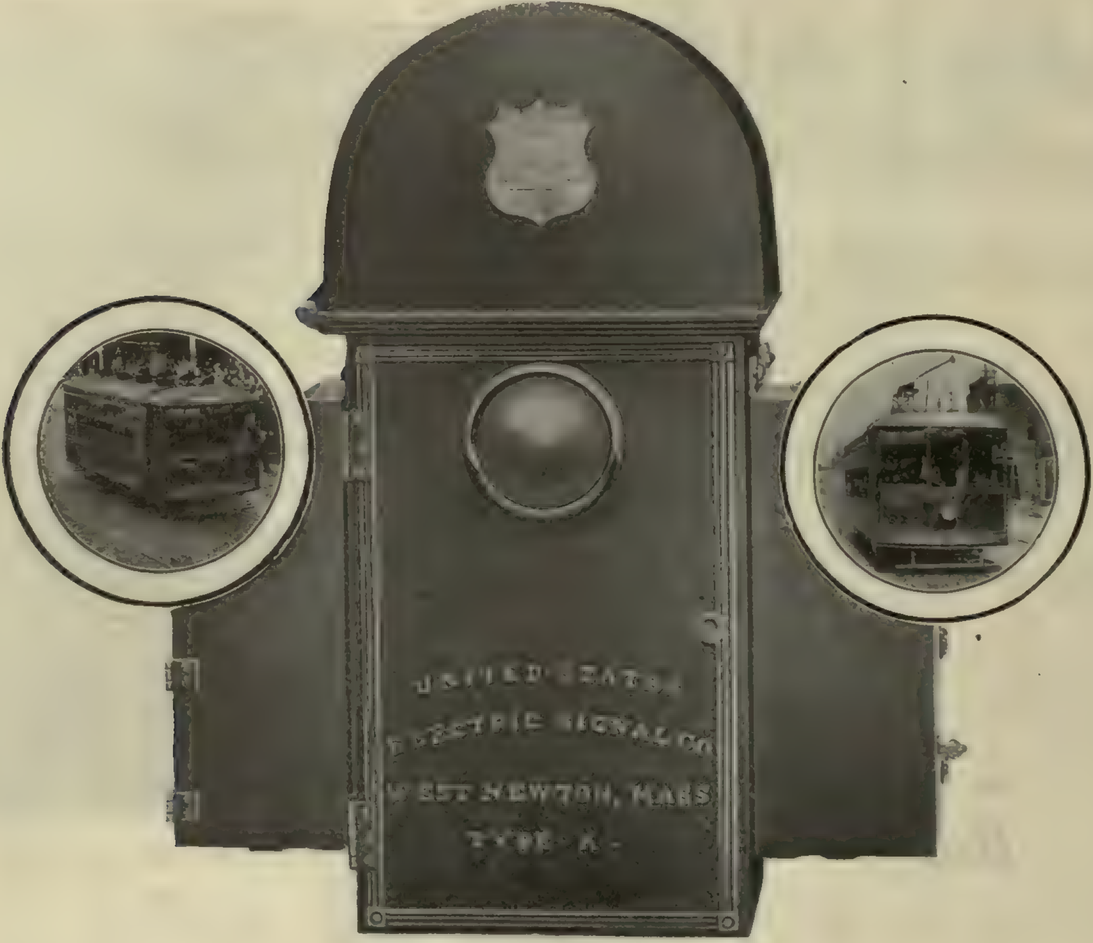
ECONOMY ELECTRIC DEVICES COMPANY

L. E. GOULD, Pres.

Old Colony Bldg., Chicago

Cable Address: Sangamo, Chicago.

National Railway Appliance Co., New York
L. A. Nott, San Francisco
Burton R. Stare Co., Seattle
J. G. Monahan, Los Angeles
Ludwig Hommel & Co., Pittsburgh
Grayson Railway Supply Co., St. Louis



The Warning Eyes

The motorman will not run by U. S. Electric Signals. They clearly show when to go — and when to stop—they cannot be misread.

U. S. Signals are automatic—there is no human element. The first car to reach a cut-in contactor has the right of way—and that is shown by the signal. They assure safety and insure you.

"Prevent" instead of "cure." Start now. Write for particulars.

United States Electric Signal Company

West Newton, Massachusetts

Representatives:

Western: Frank F. Bodler, Monadnock Bldg., San Francisco
Foreign: Forest City Electric Services Supply Co., Salford, England

Cultivate the Short Ride Customer

The man who jumps on a car, rides three or four blocks and then jumps off is the kind of passenger it pays to cultivate. The short distance rider is the profitable one.

But with fare increases, a notable decrease in the number of short ride customers is a condition which confronts many electric railroads. Higher fares and odd coins to handle discourage this class of patronage.

The problem, then, is to retain all the advantages of the unit fare while enjoying the additional revenue of the higher rate. Accomplish that result and you'll bring the short ride customer—the profitable customer—back to the fold.

Johnson Fare Boxes and Johnson Metal Tokens are bringing about a return of the short ride passenger on hundreds of the country's electric railways.

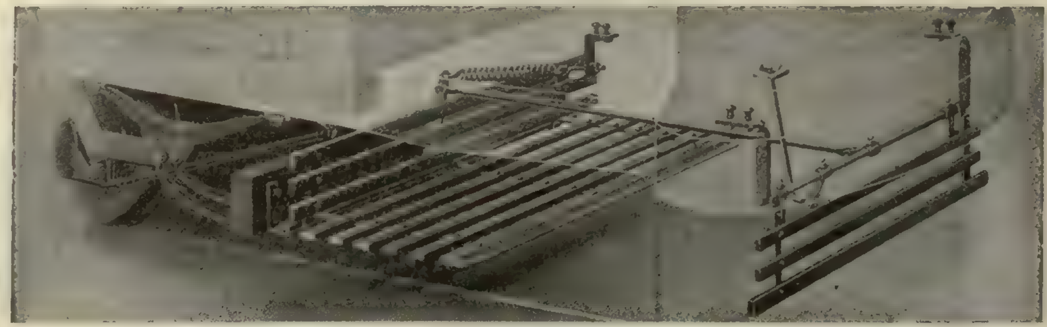
It's easy to understand why. A man with a pocket full of metal tokens forgets about the odd fare and the higher rate. To him a ride means only one less token—and he rides, regardless of whether the trip be long or short.

Our Engineering Department will gladly furnish complete data on Johnson Fare Boxes and Metal Tickets. Write for all the facts—today.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.

For SAFEty Cars



As essential to safety as the letters S-A-F-E which form part of their name.

All the other devices of the safety car operate from the inside—but

H-B Life Guards

render protection where the car might come in fatal contact with the body of the pedestrian—namely, beneath the wheels.

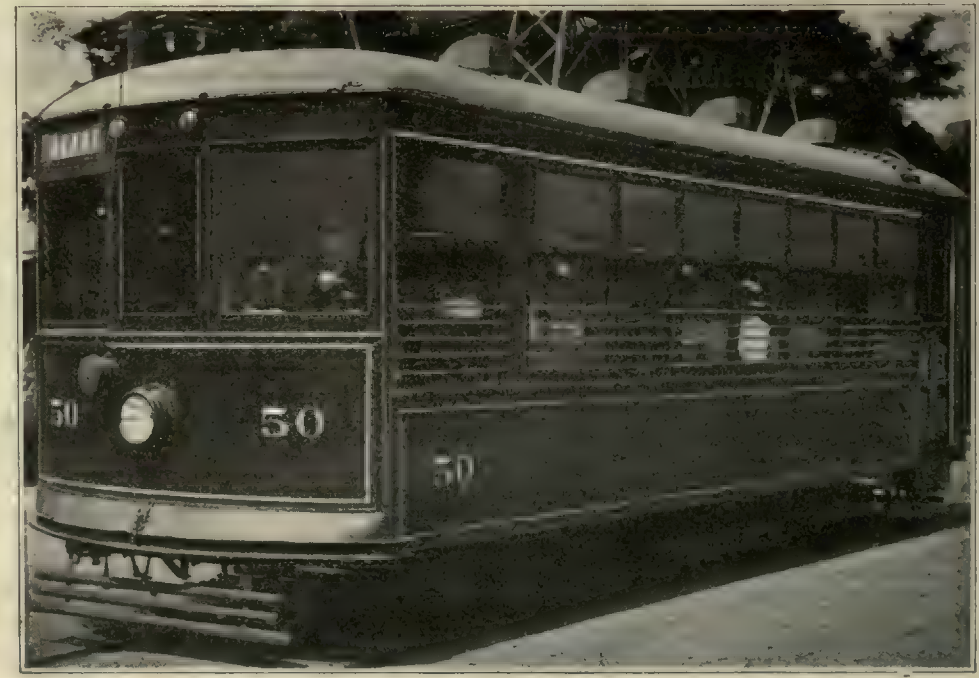
The H-B Life Guard is now the standard on most roads in this country and should be on yours.

Send for details.

The Consolidated Car Fender Co.
Providence, R. I.
General Sales Agent
Wendell & MacDuffie Co.
61 Broadway, N. Y.

Not an Attachment —an Essential

!!!



DAVIS STEEL WHEELS

Eliminate Wheel Turning Costs

Wheel turning costs have increased until they are almost prohibitive. They include labor costs, tool steel costs, lathe maintenance, depreciation, supervision costs and power consumption costs. These direct labor charges are avoided when Davis Steel Wheels are used. The one-wear feature eliminates turning.

American Steel Foundries
1100 McCormick Building, Chicago

Reducing Lubricating costs 44½%

On October second this paper carried a four-page advertisement, showing how Tulc in a competitive test with a well known brand of oil, actually reduced lubricating costs 44½%. For the benefit of those readers who may have overlooked this remarkable story we are repeating it on these pages, at the same time supplementing some figures on mileage costs which should be of equal interest to all users of lubricant.

Page 1

Comparative Cost per 1000 miles. Check with figures on the opposite page

Oil used on these cars

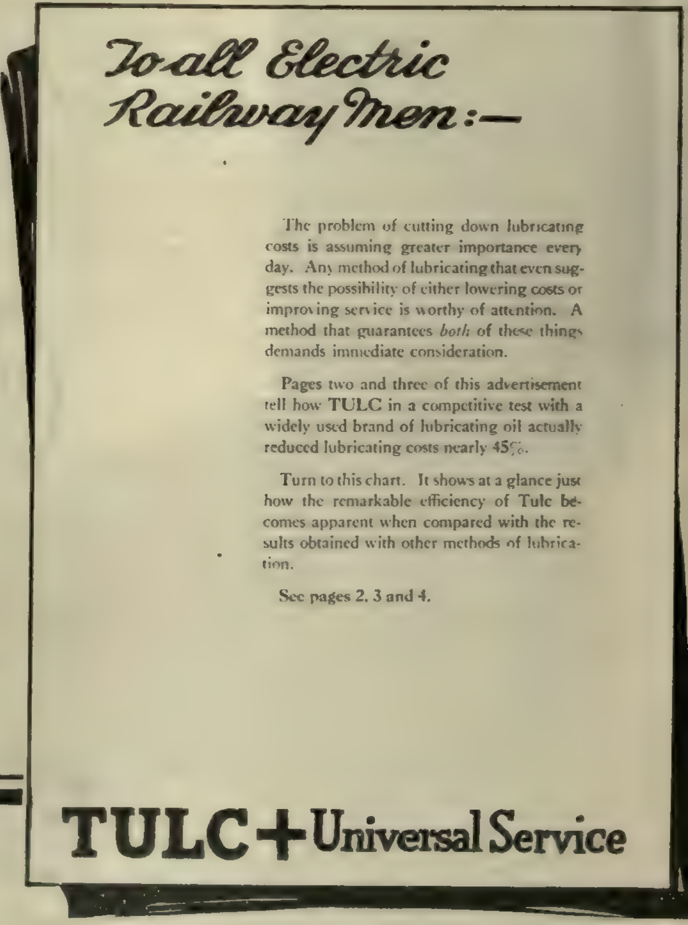
Car No.	Mileage
615	2103
633	4128
488	2468
490	2985
312	2637

$.302 *per* 1000 *miles with oil*

Tulc used on these

Car No.	Mileage
616	3965
634	2573
486	2927
492	2069
314	2934
	14468 mi.

$.165 *per* 1000 *miles with Tulc*



To all Electric Railway Men:—

The problem of cutting down lubricating costs is assuming greater importance every day. Any method of lubricating that even suggests the possibility of either lowering costs or improving service is worthy of attention. A method that guarantees *both* of these things demands immediate consideration.

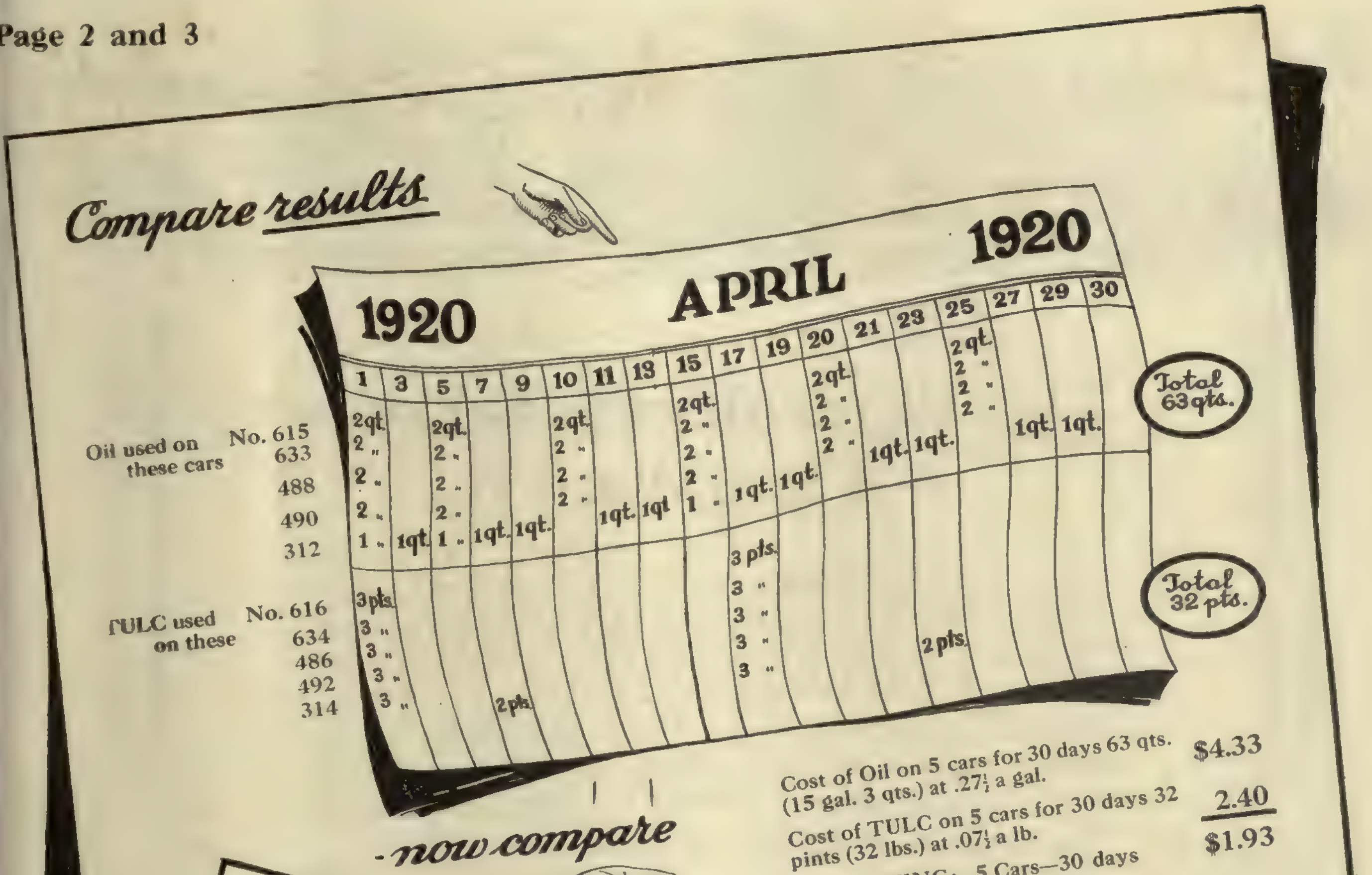
Pages two and three of this advertisement tell how TULC in a competitive test with a widely used brand of lubricating oil actually reduced lubricating costs nearly 45%.

Turn to this chart. It shows at a glance just how the remarkable efficiency of Tulc becomes apparent when compared with the results obtained with other methods of lubrication.

See pages 2, 3 and 4.

TULC + Universal Service

Page 2 and 3



Compare results

1920 APRIL 1920

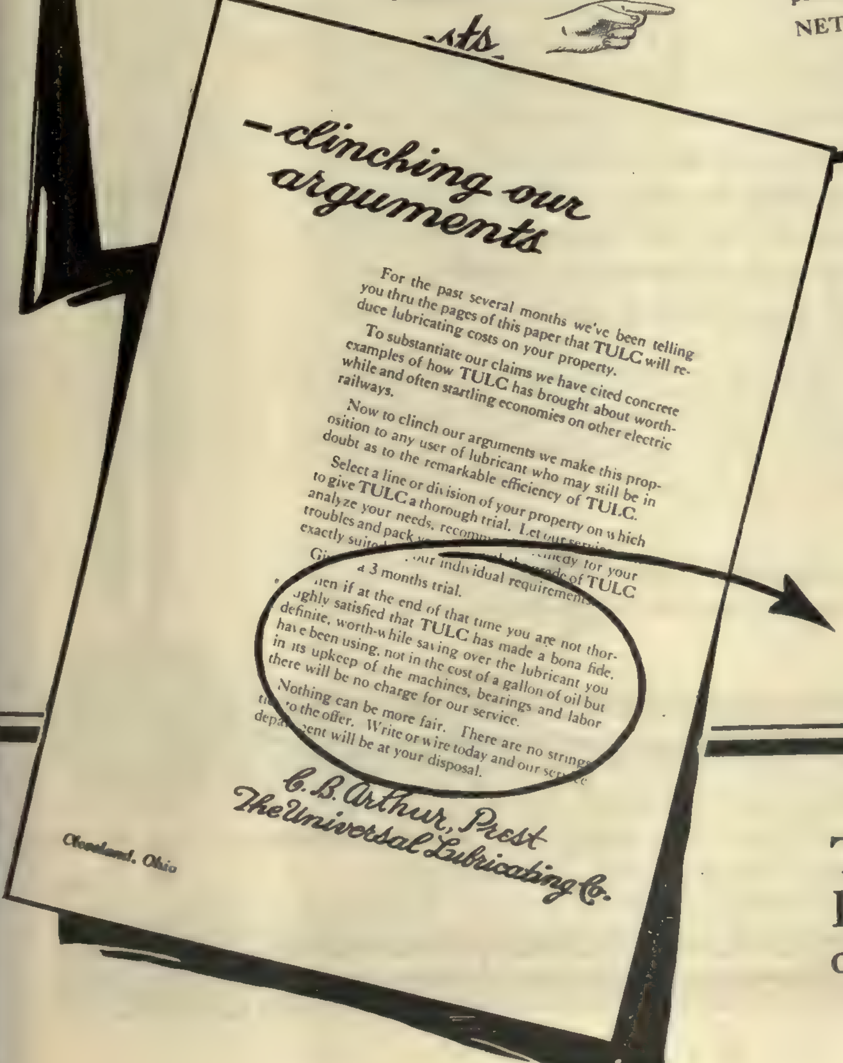
	1	3	5	7	9	10	11	13	15	17	19	20	21	23	25	27	29	30
Oil used on these cars No. 615	2qt.		2qt.			2qt.			2qt.			2qt.			2qt.			
633	2 "		2 "			2 "			2 "			2 "			2 "			
488	2 "		2 "			2 "			2 "			2 "			2 "			
490	2 "		2 "			2 "			2 "			2 "			2 "			
312	1 "	1qt.	1 "	1qt.	1qt.		1qt.	1qt	1 "	1qt.	1qt.		1qt.	1qt.		1qt.	1qt.	
TULC used on these No. 616	3pts.									3 pts.								
634	3 "									3 "								
486	3 "									3 "								
492	3 "									3 "				2 pts.				
314	3 "				2pts.					3 "								

Total 63 qts.

Total 32 pts.

Cost of Oil on 5 cars for 30 days 63 qts. (15 gal. 3 qts.) at .27¼ a gal.	$4.33
Cost of TULC on 5 cars for 30 days 32 pints (32 lbs.) at .07½ a lb.	2.40
NET SAVING: 5 Cars—30 days	$1.93

-now compare *...sts*



-clinching our arguments

For the past several months we've been telling you thru the pages of this paper that TULC will reduce lubricating costs on your property.

To substantiate our claims we have cited concrete examples of how TULC has brought about worth-while and often startling economies on other electric railways.

Now to clinch our arguments we make this proposition to any user of lubricant who may still be in doubt as to the remarkable efficiency of TULC.

Select a line or division of your property on which to give TULC a thorough trial. Let our servi... analyze your needs, recomm... troubles and pack y... exactly suit... ...our individual requirements ...medy for your ...grade of TULC

Gi... a 3 months trial.

...hen if at the end of that time you are not thoroughly satisfied that TULC has made a bona fide, definite, worth-while saving over the lubricant you have been using, not in the cost of a gallon of oil but in its upkeep of the machines, bearings and labor there will be no charge for our service.

Nothing can be more fair. There are no strings ...to the offer. Write or wire today and our service department will be at your disposal.

C. B. Arthur, Prest
The Universal Lubricating Co.

Cleveland, Ohio

Page 4

Special Offer

This offer is not "special" in the sense of being made for a limited period. It is open to any Electric Railway—anywhere—anytime. If you have not already taken advantage of this opportunity to reduce *your* lubricating costs with Tulc, write or wire today. Our service men are waiting to serve you.

THE UNIVERSAL
LUBRICATING CO.
CLEVELAND OHIO

The World's best Lubricants

That Extra Mileage Is Yours —If You Want It

The rapidly increasing demand for *Galena Electric Car Oil* is due to the general recognition of its exceptional lubricating ability, as shown by the remarkable service records attained on hundreds of Electric Railways throughout the United States. These performance records show not only a substantial increase in miles to the gallon —as compared to other oils—but a practical elimination of that menace to efficient operation—the *hot box*.

GALENA ELECTRIC CAR OIL is made, of course, by Galena process and carries in suspension a percentage of oxide of lead, which fills the interstices and microscopically rough surfaces of the journal and produces an absolutely smooth surface, thereby reducing friction to a minimum. The result is—greater mileage, longer life to journals and bearing surfaces and the avoidance of costly delays due to tie-ups through hot boxes.

Galena lubrication methods are the results of specialization and long experience; a practical test is all that is necessary to prove their value in producing efficient and economical lubrication, and the test is yours for the asking.

When Galena Service Goes In—
Lubricating Troubles Go Out!

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

The World's best Lubricants

GALENA QUALITY

Oils That Save Their Cost —In Service

It is surely just as important to have satisfactory lubrication in the power house as on the cars. *Galena Power House Valve and Engine Oils* are built to give service—not fair to good service occasionally, but satisfactory, dependable service all the time. Made of the highest grade, selected stocks, these oils have a reputation for uniformity and reliability that has been built upon years of exceptional service giving.

Experience has taught the lesson that lubrication costs cannot be correctly estimated by the cost per gallon of oils. There are other factors dependent upon proper lubrication, such as fuel, wear and tear on machinery, repairs and replacements, that must be considered. Therefore it is lubricating units of ***service*** and ***not of gallons,*** that counts. Galena Power House Oils are not ordinary lubricants, but special treated products of extra strength and vitality that gives longer life and increased efficiency. There are many instances where they have actually saved their cost by savings effected in the items above named.

TRIGRAM G S O C TRADE MARK

Galena Quality Is Our
Bond and Your Security!

THE GALENA-SIGNAL OIL CO.
NEW YORK FRANKLIN, PA. CHICAGO
Offices in all principal American Cities
LONDON BUENOS AIRES PARIS

GALENA SERVICE

A large percentage of accidents on trolley lines happen at night. Anything therefore that safeguards night operation materially affects the claim department

G-E Headlights Reduce Accident Claims

From 800 to a 1000 feet in which to check speed in emergencies provides a good factor of safety. If your motormen operate under such conditions, your claim agent will have less work.

Where roads cross the right-of-way and an up-grade or other cause of overload reduces line voltage, conditions are ideal for a serious accident. With a GECO resistor and an incandescent headlight, however, vehicles and pedestrians are warned in ample time by the headlight's beam and also the motorman can see in time to stop, obstructions that might wreck his car.

Incandescent headlights have low maintenance and comparatively no repair cost. They are made highly efficient by the GECO resistor which maintains practically constant current regardless of trolley voltage fluctuations.

GECO Lights are Always Bright

Ask us for Bulletin 63,800

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

35C-56

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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A. D. KNOX, Editorial Representative GEORGE BUSHFIELD, Editorial Representative G. J. MACMURRAY, News Editor W. R. ANDERSON, Assistant News Editor

Volume 56 New York, Saturday, October 16, 1920 *Number* 16

P. H. Gadsden for President of the Association

THE selection of Philip H. Gadsden for president of the American Electric Railway Association is a wise choice. His very important part in the work of the Federal Electric Railways Commission has given him a vision of the industry as a whole and a comprehension of its problems that make him pre-eminently fitted for the place. The responsibilities of the office at this time are exceedingly great and critical, for upon the manner in which the industry proceeds to rehabilitate itself and carry into execution the recommendations of the Federal commission depends the future of the electric railway business. Mr. Gadsden also has a very keen and enlightened understanding of the problem of public relations, which is undoubtedly a vital part of the reconstruction work to be done.

In connection with its report the committee on nominations made a recommendation of great importance in connection with future workings of the association. It set up this year as the fixed policy of the association that in the selection of officers the association should be guided by the requirements of the time, unaffected by the choice of previous years. This is contrary to the custom of advancing the vice-president in succession. Without reference to the elections just consummated, the wisdom of this general principle is obvious.

American Executive Committee Enlarged

THE action of the association in enlarging the executive committee from fourteen to twenty members by the addition of six members-at-large is also a good move for the reasons given for this change by President Pardee in his presidential address. The association has always been fortunate in the composition of its executive committee. The constitution adopted at the time of the reorganization in 1905 has brought to the body the services of distinguished executives who have given unstintingly of their time and thought to the welfare of the association. Nevertheless, it is at least theoretically true that changes in policy considered desirable by the body at large cannot quickly be registered under the practice which has really meant that but one railway man is elected an officer of the parent association each year. This, with the fact that past-presidents of the parent association are members of the executive committee, though without vote, has still further tended to prevent changes in policies which have once been adopted.

The recognition of the interests of the manufacturer members of the association by the addition of five members to the executive committee when the manufacturers were admitted to membership was a step in the right direction, and we believe that the changes authorized at Atlantic City are in the interests of the association.

An Appropriate Conclusion of an Eventful Year

THE convention as a whole was a fitting conclusion of the association year, which has been a most eventful one. In October, 1919, the association had just completed the greatest task it had up to that time ever undertaken, namely, the collection and presentation to a Federal commission of a complete analysis with statistics of the status of the industry. The evidence was in, but the result was in doubt.

Every one knows now the successful outcome of this task. With the facts before them the commissioners could give but one verdict, and while the decision has no legal binding value its effect is already being widely seen in a better popular recognition of electric railway conditions. The improved feeling in the industry was reflected in the convention just past, where the prevailing note was optimism and a renewed courage to solve the problems of better serving the transportation needs of the public.

A review of the association year, even so brief as this, would not be complete without a statement in regard to the administration under which these changes have taken place. President Pardee was well fitted for the task to which he was called two years ago, possessing as he does that combination of conservatism and progressiveness which insures results. He has given ungrudgingly of his time and energy to the association and the industry during his term of office; has wisely guided its affairs during this critical period, and has been most succesful in inspiring his fellow members with his faith in the future. To his constructive policy is due largely the present more hopeful condition in the industry today.

The Motor Bus Is at the Convention

A NOTABLE innovation at the 1920 convention was the exhibition on the pier of gasoline-propelled motor buses by two manufacturers. This, and the reading of three important papers before the parent association, may be said to constitute the formal introduction of the motor bus into the transportation business of the electric railway industry. The railways have thus recognized the place of the bus as an ally, and the manufacturers acknowledged the electric railway field as a proper and logical one in which to develop the use and consequent sale of their product. The other vehicle much in evidence at the convention was of course the standard safety car. One might muse that here was the last word in the electric rail car and the beginning of the development of the non-rail vehicle.

The significance of the motor bus is certainly becoming more apparent and its place better defined in the problems of urban and interurban transportation. Where extensions to city systems are needed the use of the bus as a feeder to the end of the electric line is very attractive as a means of avoiding the investment in track and overhead extension. The advantages of this use of the bus were very generally recognized by the railway men as well as by the representatives present from the automotive industry. And looking ahead, it seems probable that where interurban transportation in limited amount has to be cared for the merits of buses will be considered carefully before an electric railroad will be built. The low investment required is the chief merit of the bus for such service.

Effective Schedules Impossible Without Traffic Regulation

MORE or less correlated were the reports of the committees on code of traffic principles and economics of schedules, presented at two sessions of the T. & T. Association. No time-table, however safeguarded for elimination of wasteful hours and for efficient placing of cars, can be effective without sensible regulation of traffic. It is, of course, too much to expect that the model traffic ordinance will gain universal support at its inception. Opposition must be expected in the endeavor to give street cars absolute right of way at intersections, and the railway interests should be content if at the start they can secure the support of public authorities and civic bodies for a majority of the items listed in the proposed ordinance.

Those who had to do with the framing of standard rules for transportation some years ago will recall how disheartening were their early efforts because of the timidity of operators who could see nothing but insurmountable obstacles in different "local conditions." The standard rule book is still "standard," however, although changes were made here and there to suit individual company requirements. Public officials who have charge of the regulation of traffic are keen for concerted action because of the growing density of vehicle congestion. If the railway interests are not too insistent on 100 per cent approval of their views they are likely to get through a code of traffic principles which if enforced will make safer the public streets, expedite traffic in general and give users of public conveyances preference over other vehicles and over pedestrians. The convenience of the few must in the end yield to the convenience of the many.

The committee on economics of schedules has performed a helpful service to the industry in showing how deceptive are all prevailing comparisons of car speed as indicated by car-miles and car-hours. Analysis of the latter factor shows that few properties have an identical list of items making up "bonus time," and while this has to be included with revenue-hours to show the cost of platform expense, it is necessary to segregate the actual time of operating between terminals to reach a satisfactory basis for determination of "speed." Perhaps added value will come of this investigation in showing how expensive are the terms forced by labor contracts, some companies having as high as 15 per cent of bonus time as a burden on the cost of service. The "minimum day" and "straight time" for platform help are undoubtedly a serious handicap on tripper service, and when the public interest suffers because of a too grasping union it is well that car patrons should know what stands in the way of possible reduction in rates of fare or of improved schedules which will speed up traffic. The truth cannot harm the railway cause.

Has the Paper Ticket Become Obsolete?

SINCE the use of metal tokens on street cars has become common practice on a large number of properties, big and little, their practicability has been thoroughly established. If one stops to consider, then, when paper tickets should be used and when metal tickets in regular city service the metal tickets seem to show up more favorably in practically every point. On the basis of cost of tickets, the cost of handling or the accuracy with which the conductor's turn-in may be checked, either with or without registering or locked fare boxes, the comparison seems to be strongly in favor of the metal token. We refer particularly to regular city service, because on rapid transit lines where the tickets are sold from a reel and immediately destroyed in a chopper after being used another set of conditions applies.

Let us first consider the question of cost and assume that the trolley company hauls 100,000 passengers a day, of whom 75 per cent ride on tickets, or 75,000 tickets used per day. This would require the purchase of 27,000,000 paper tickets a year. While it used to be possible to buy paper tickets in large quantities at 9 cents a thousand or thereabouts, they now cost about 35 cents for a good lithographed job. At present prices, then, the first cost of the year's supply of paper tickets for this assumed traffic would be $9,450.

Experience has shown that where there is a good reduction in cost per ride to induce the use of tickets, ten times the daily number of tickets used gives an ample supply of the metal tokens. In our assumed case, then, the number of metal tickets necessary would be 750,000. For this small quantity the price would probably be $8.25 a thousand, or a total first cost of $6,187.50. This is $3,262.50 less than the cost of one year's supply of paper tickets, and since the metal tickets can be used over and over again, this cost may be spread over at least ten years, for the life of the tokens is about the same as that of coins and the shrinkage through loss is very small—less than 1 per cent a year. Hence it would seem to be a fair comparison to state that the relative annual costs would be $618.75 for metal tickets, against $9,450 for paper tickets, or, for ten years, a cost of $6,187.50, as against $94,500, not taking into account the extra cost of handling paper tickets in the accounting department. Or even assuming old pre-war paper-ticket prices and post-war metal-ticket prices, we have an annual cost of $618.75, against $2,430.

From the standpoint of the public, the metal tokens are preferable because they do not become crumpled, dirty, soft from perspiration, perhaps to the point of rejection and consequent argument. The conductor likes them better for these same reasons. The accounting department finds the metal tokens can be accurately counted and separated from other coins by machines. While paper tickets can be counted by machines if in perfect condition, there is more or less trouble because of an occasional crumpled or soft ticket, and hence counting by hand or weighing is resorted to usually. Also, there is the advantage that metal tokens can be used with registering fare boxes while paper tickets cannot. As to the opportunity for counterfeiting, the metal tickets seem to offer an even less attraction than paper tickets. The metal tickets are made of german silver and have a high intrinsic value, and to make them requires very expensive dies and other machinery. What few counterfeits have been observed in the cities using them have been made of lead and were so crude and different in appearance from the regular tickets that they could escape the scrutiny of the conductor only through the most careless inspection. The fact that there has been almost no counterfeiting of the metal tokens on the properties using them seems to bear out the theories advanced as to why there would not be any.

All of these advantages for the metal tokens noted thus far apply whether a company is using a registering fare box, a locked fare box or no fare box at all. Where a registering fare box is used several other advantages accrue.

We are acquainted, it is true, with cities where paper tickets are still preferred, but the tendency is certainly in the direction of the metal token.

"Load Factor" Is a Term of Wide Application

WE ALL remember the fable of the hare and the tortoise. The latter won in the long run because he kept steadily at it, while the speedier fellow ran only in spurts. In other words, the tortoise operated at the higher load factor. That's the whole story in a nutshell, and the same principle holds whether it is a footrace, a power plant load, an electric car line or a coal mine. The point is that when any kind of equipment is used uniformly, rather than in spurts, the operation is most efficient and the least amount of investment is needed.

Take the matter raised by Eugene McAuliffe in his paper on the coal supply, read at the convention of the American Association on Oct. 12. He applied the load-factor idea to the basic fuel industry, and showed that the seasonal congestion in the production and utilization of coal plays an important part in making the cost of fuel high. Obviously, coal cannot be consumed uniformly. Hence, if it is to be produced uniformly, it must be stored somewhere, and if it is to be produced and transported uniformly the storage must be at or near the point of consumption. Fortunately coal is a commodity which can be stored practically without loss, and, considering the amount of energy contained in a cubic foot, two hundred kilowatt-hours or more, an enormous amount of potential energy can be stored on a reasonable space, say an acre. The losses due to weathering and overhead cost in consumption during storage are more than offset by the insurance against interruption, and if the purchase price per ton can be cut down also, the saving here is "so much velvet." The problem is to get consumers to spread out their fuel orders so as to bring about the desired consummation outlined by Mr. McAuliffe.

The possibilities in the line of saving through improved load factor in the fuel field are even greater than they are in the boiler and turbine rooms, where presumably the idea was first extensively developed. Electrical energy cannot be stored to any great extent. In the waterpower realm some water storage is possible, but topographical conditions must be favorable. But there are few places where an acre or two cannot be found within easy reach of the power plant for coal or oil storage purposes. Such areas would be found even more extensively than they are if the coal producers and the railroads would provide a seasonal variation in price to accelerate buying during the "off-peak" seasons.

Some of the Ramifications of Standardization

THE outstanding thing in regard to electric railway equipment and practices is the effort, one might almost say the struggle, of manufacturers and railway companies to standardize. Now the ultimate aim in this effort is economy, and it is only the promise of money saving that will convince individuals and companies that they must give up pet notions if necessary in order to bring standardization about. There is increasing evidence that they are giving up at least some fads and using stock products to an increasing extent. The engineers have pushed standardization the hardest, and the designs promulgated by the Engineering Association are coming to be regarded in the same light as those which for years have made the Master Car Builders' and other steam road associations famous. And now the association is going into the American Engineering standards committee, a step which will enhance the reputation of its efforts.

A good example of the benefits of standardization was cited in the paper by P. F. McCall before the Engineering Association at Atlantic City on Tuesday. Mr. McCall is storekeeper for a large railway property and is therefore in a position to know what is to be saved and gained by reducing the number of stock parts which must be kept on hand. The same idea was brought out before the accountants. It is simple enough, and it can be put into a few words, like these: If one part can be put to two possible uses, fewer items need be kept in stock; if manufacturers' stock parts are ordered, delay will be avoided, and if many purchasers will use the same designs, manufacturing costs will be lowered. Here are three money-saving considerations. Are they not enough and convincing?

The Millionaire in the Subway; the Bricklayer in the Taxicab

ACCORDING to a New York paper, times have changed. A young lady writes an interesting article about the prominent bankers and business men she elbowed in the subway on her way to and from work.

Next we read of a taxicab drawing up in front of a well-known hotel from which two well-dressed men emerge carrying real leather bags. Paying their taxi driver from a fat roll of bills, they entered the hotel, and curious bystanders were startled a little later to see them emerge dressed in overalls and carrying trowels. They were bricklayers working near by.

Why do the millionaires now ride in the subway when they have cars of their own?

The answer is congestion of streets and the value of time. With the bricklayers going to work in taxicabs the bankers can't possibly get downtown quickly in their cars, so they take the subway. The bricklayers have plenty of money, comparatively speaking, and are enjoying an unaccustomed luxury. Both bricklayers and bankers are good natured about such conditions, but here is something for railway men to think about.

What factors caused the decrease in the population of Manhattan and are causing the movement of banks and offices from Wall Street to Forty-second Street and vicinity? Congestion of streets by automobiles and lack of adequate transportation facilities are important factors in the growth of any city with more than 2,000,000 inhabitants.

Industry on Road to Better Days*

By John H. Pardee

President American Electric Railway Association

Recognition by Public of Essential Nature of Electric Railway Industry Is Growing—General Situation Discussed—Internal Affairs of Association—Increase in Size of Executive Committee on Publicity and Committee of One Hundred Suggested

THIS, the thirty-ninth annual convention of the association is assembled under circumstances which give us good cause for optimism, both as to the future of the industry, which the association represents, and as to the part that the association will play in the development of that future.

I have no hesitancy in saying that never before in its history have the affairs of the association been in such a satisfactory condition. The membership has increased and is still increasing and the industry generally is giving to the organization splendid support. These conditions are reflexes of the work which the association is performing. In every respect its usefulness to the industry has been increased, and the co-operation given to its officers plainly indicates that the railway companies of the country and their executives are coming to appreciate more and more not only the essential nature of the service which the association renders, but the absolute necessity of that service and the desirability of increasing the association's ability to perform it in the most efficient manner.

Mr. Pardee has steered the association ship through the storms and stress of the most trying period in the history of this country. He retires from the presidency at a time when the skies are clearing and when the haven of a reasonable net income is in sight.

The secretary will later give you a detailed account of the association's activities. You will, I believe, be surprised at their variety and extent. Their recital indicates to me that the association has reached a stage in its development where it is performing for the member companies a necessary, practical service that has an important bearing upon the economy and efficiency of their operation, and that could be performed in no other way so completely or so well.

There is scarcely a phase of electric railway operation and management, financial, engineering, operating, or those dealing with policy, that has not been the subject of investigation by the headquarters staff during the past year, and concerning which information has not been compiled and distributed. In no other way than through the association could this work have been done, and the most significant report that I have to make to you today is that there is a real and growing appreciation by the industry of the value of these efforts, and a constantly increasing spirit of co-operation in the task of making the association of greater and greater usefulness in this respect. When I assumed the office of president, two years ago, I asked of the association members a full measure of that co-operation without which the officers of the organization could not hope to accomplish the work that was committed to their charge. That co-operation has been forthcoming in the fullest degree, and whatever has been achieved for the association and for the industry has been made possible because of the loyal response made by both railway and manufacturer members whenever they were called upon for assistance.

The association, now as never before, is representative of the entire industry. At the last convention, through amendments to the constitution and by-laws, providing for representation of manufacturer members upon the executive committee, the final steps in the process of welding together the two major interests—railway and manufacturing—were taken, with a most harmonious result. In the conduct of the association's affairs, and especially in the work that is being performed by the technical committees of the affiliated associations, the admission of manufacturer members on terms of absolute equality is producing good results, and the association is now prepared for the consideration of any problem, assured of the best thought and best advice from the two most important angles.

Our problem for some years has been not so much the creation of an efficient working organization, since that was largely a matter of proper organization and proper direction, but to bring to the electric railways of the country a better realization of what the association was actually accomplishing, and of its potential powers of accomplishment, in order that the necessary financial and moral support might be forthcoming. We are making real strides in this direction. The very substantial increase in dues made effective in 1919 brought comparatively few resignations, and of the companies that withdrew a substantial number have rejoined. In addition, thanks to the well-directed efforts of our very efficient committee on company membership, a considerable number of companies not before members have been enrolled, and the committee's experience indicates that by persistent personal effort further gain can be made.

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*Presidential address delivered at annual convention at Atlantic City, N. J., Oct. 12, 1920.

Once more I wish emphatically to state my belief that it is the absolute duty of every railway company to be a member of this association, and executives who do not authorize such membership are not properly conserving the interests of their stockholders and investors.

INCREASE IN SIZE OF EXECUTIVE COMMITTEE

Efforts should be made to bring the membership of the association in closer touch and closer harmony with the association's work. Our present form of organization, while, in my opinion, particularly efficient from the standpoint of getting things done, is not sufficiently democratic to insure the most complete understanding between those in direct charge of the association's affairs and the membership as a whole.

The association is now administered by an executive committee consisting of the president and the four vice-presidents, the presidents of the four affiliated associations and five manufacturer members. I am convinced that a much closer relationship between the actual directing force and the members may be obtained without any diminution in the organization's effectiveness.

Accordingly, I recommend that the constitution and by-laws of the association be so amended as to create an executive committee of twenty instead of fourteen as at the present time, the committee to consist of the president, the four vice-presidents, the four presidents of the affiliated associations, five manufacturer members, as at present, and six members elected at large, each to serve for a term of one year, and to be ineligible for re-election for one year from the date when his term expires. If this is looked upon favorably I recommend that you elect at this convention these additional members of the executive committee, which members can act without vote until the constitution is amended at the mid-winter meeting.

It seems to me that in this way there will be a constant influx of new blood into the direction of the association's affairs, and that the thought and wishes of the industry will be more fully and directly registered than under the conditions now obtaining.

CHANGES RECOMMENDED IN COMMITTEES

It has been possible for the association to perform an increasingly important work along the lines of broad publicity for the industry during the last year. The importance of this work cannot be overestimated. The so-called electric railway problem has come to be recognized as a matter of profound public interest, and public attention is everywhere being devoted to the readjustment of present conditions. Our course of conduct is well indicated for us. It is our duty to work with the public and not as an independent group. The information, the knowledge, the experience necessary to a proper and satisfactory solution are in our possession and to the degree which we make this available to the public, the outcome will be satisfactory. The field of our useful activity in this respect is well defined. It is distinct from purely local publicity and should confine itself to the more general and universal phases of its subjects.

A publicity committee of exceptional personnel was organized during the year. It has carefully considered the possibilities before it and is convinced that a work of great benefit and importance may be performed. The success that attended the efforts of the Committee of One Hundred in this respect is well known to it. It may be truthfully said that through the work of that organization, the popular conception of the electric railway problem has been so changed that it is no longer regarded merely as a local question involving only local issues, but is considered in its true light as a national problem, involving great economic and political principles, and that its correct solution is a concern of all the public.

At a meeting of the executive committee of the Committee of One Hundred in New York recently the question of the future of the committee was thoroughly discussed and a resolution unanimously adopted recommending that the committee be continued for the purpose of carrying on the public dissemination of information. This resolution will come up for consideration at a meeting of the entire Committee of One Hundred to be held in Atlantic City later in the week. I trust that it will then be approved and that the committee will then be continued in the interest of the industry. If this be done, I recommend that the work of the association's committee on publicity be amalgamated with that of the Committee of One Hundred and carried on under its direction.

AFFILIATED ASSOCIATIONS HAVE BEEN EFFICIENT

Your affiliated associations have during the year just passed functioned in a manner particularly efficient. Their activities, interrupted during the war, are now again under way, and the investigation of those subjects which most intimately affect problems of accounting, engineering, operation and the disposition of claims have been resumed. Attendance has been as large and the work has been as actively pursued as heretofore. A study of the program of the affiliated associations will disclose to you better than I can do it the nature of the work that they are doing, as well as its great value.

STABILITY OF INDUSTRY DEMONSTRATED

The industry which we represent has, I am firmly convinced, passed through its period of greatest travail, and is now upon the road to better days. Statistics indicate for practically all companies both larger earnings and increased riding. Some companies are now earning a satisfactory return, and many are earning an amount above their operating expenses and fixed charges, while few are in that desperate financial condition that was present with nearly all of them two years, or even a year, ago.

This showing emphasizes the inherent stability of the electric railway industry. The troubles that have come to it are not the result of any causes involving the nature of the enterprise. No business in the world is more certain or assured. The service performed is a necessary service. It will be essential so long as communities exist. From the disaster that has overtaken it, it emerges with none of the demand for its service destroyed, and, under conditions that would have caused the disintegration of most private industrial enterprises, it has remained intact.

Its misfortunes have been the result of mistaken policy in conduct by the men who operated it and mistaken policy in its control and regulation by public authorities. There has been too wide a departure from basic economic law in both instances, so that when an emergency came, the industry was in no condition and without the means to guard itself. What then was and is needed to restore it to a completely sound condition is the recognition and the adoption of a certain few common-sense principles that are by no means new, but which because of the rapid development of the industry have been lost sight of.

The most encouraging sign of the present times in so far as electric railways are concerned is the growing public recognition of these principles. A perusal of the reports of the numerous commissions, national, state and local, that have investigated and studied electric railway affairs discloses a striking unanimity in the conclusions reached. The three foundation conclusions met with in the report of the Federal Electric Railways Commission are distinctly stated and alone more than compensate for the time and effort of the commission. This report carries an authority which is most beneficial and far reaching.

These basic principles are:

First—That the industry is an essential industry and that there is in sight no means of local transportation that can adequately perform its function.

Second—That under existing conditions public ownership and operation is inadvisable in the interest of the public.

Third—That in the regulation of electric railways provision must be made through fares for such an adequate return upon the capital used and useful in the public service as will restore general credit, inspire confidence in investors, and insure a continuing flow of new capital.

Cardinal Points Made by President Pardee

The electric railway industry is essentially stable. The troubles that have come to it are not the result of any causes involving the nature of the enterprise. No business in the world is more certain or assured. The service performed is a necessary service. It will be essential so long as communities exist. From the disaster that has overtaken it, it emerges with none of the demand for its service destroyed, and under conditions that would have caused the disintegration of most private industrial enterprises it has remained intact. Its misfortunes have been the result of mistaken policy in conduct by the men who operated it and mistaken policy in its control and regulation by public authorities. There has been too wide a departure from basic economic law in both instances, so that when an emergency came, the industry was in no condition and without the means to guard itself. What then was and is needed to restore it to a completely sound condition is the recognition and the adoption of a certain few common-sense principles that are by no means new, but which, because of the rapid development of the industry, have been lost sight of.

These principles are being reflected in all of the other reports which I have examined and seem to me to indicate a growing public knowledge of the economics of the situation and to form a basis for a lasting readjustment of the industry's affairs.

RE-ESTABLISHED CREDIT FOR ELECTRIC RAILWAYS NECESSARY

There is general recognition of the necessity of higher fares. Statistics gathered by the association show that in more than 500 cities in the country electric railways have increased their fares. In 81 such communities having a combined population of more than 6,500,000 people a 10-cent base fare is charged, in 58 others the base fare is 8 or 9 cents, while in more than 300 it is either 6 or 7 cents. And contrary to prophecies and statements, made in connection with the subject, there has been no general decrease in the number of passengers occasioned by these increases. Fares are but responding to the influence of the general higher price level. They have not, however, kept pace with the increase in individual income and the ability of the public to pay them, and that is a sufficient guarantee that there will be no general falling off in the riding habit for this reason.

But neither increased revenue, increased riding or the public disposition to permit of increased fares has as yet restored the credit of these companies, and without credit the future usefulness of this utility will most certainly be destroyed. The investor has been badly used in the last few years. He has been compelled to shoulder the entire burden of costs caused by the failure of the machinery of public utility regulation to respond to a great economic emergency. His confidence has been destroyed to a degree that makes its restoration impossible until there is some satisfying assurance that his interests will not again be sacrificed through a failure to apply the fair and just principles of upright business dealings to the regulation and control of the electric railway industry.

I can see plain signs that this assurance will be forthcoming. I can read in recent decisions of courts and commissions and in settlements that have taken place in many communities not only a desire for equitable adjustment but a growing recognition of the right of investors in the public utility securities to receive the same treatment that is accorded to other enterprises, and of the necessity of providing such safeguards to capital in these utilities as will preserve its integrity and assure to it an adequate and satisfactory return. Flexibility in fares and charges, flexibility in the rate of return, a greater freedom of management, public protection against unfair competition—these are essential to the restoration of credit, and it is these essentials that are being more and more frankly recognized by the representatives of the public and by the public itself.

The day is not far distant when these principles will everywhere be so fully understood and appreciated that regulating laws, ordinances and franchise contracts will be based upon them, and when this is done the question of electric railway credit will be solved, the railways will be able fully to function in the public interest, and public utility investment will regain its proper place as the soundest, safest and most conservative investment next to government securities.

With this convention I am ending my service of two years as president of your association. When I assumed office I asked for the co-operation of all the membership, railway and manufacturer. It has most willingly and fully been accorded me. I am sincerely appreciative and regret that I have not words in which adequately to convey my sense of gratitude for the support that has been given me by my fellow officers, by our able and efficient secretary and his staff, by the technical press, and by each and all of you whom I have called upon for advice and assistance. It is with feeling of pride in the association, with confidence in its future and with the greatest hopes and belief in the future of the industry that I am relinquishing my charge.

The Settlement of Labor Disputes*

By Hon. Henry J. Allen
Governor of Kansas

The Government Has a Right to Insure the Continuity of Public Service—The Right to Work Is as Sacred as the Right to Loaf—Experience in Kansas Cited to Illustrate Fundamental Relations of Workers and the Public Welfare

Gov. Henry J. Allen

THERE is coming to the people of our country a new appreciation of the fact that electric railways are obliged to take in more than they pay out, a new appreciation of the fact that this industry is essential to the growth of institutional life and community life. There has been existent in the country for a long while the unjust feeling that the electric railways are a necessary evil, but the situation will improve. Out in my State, during the last nine months, a court which I appointed has increased street car fares in four localities and there is still a reasonable probability that I may be re-elected, although I do not deny that it is not helping my vote any.

I am going to discuss a theme which is probably the most challenging one in the United States today, the theme of industrial relationship. After we have settled everything else, after we have decided whether we are going into the league with Harding or stay out of the league with Cox, after we have made all these arrangements, we shall still have with us the industrial problem.

In Kansas we have sought to stabilize this relationship by turning over to a Court of Industrial Relations the age-old quarrel. I shall relate the progress made in the few months since this court was provided for in our statutes, giving first a little of the background against which we built this new expression of justice.

How the Coal Strike Was Broken

You all remember that when the coal strike came on last winter, a monstrous attack on the public, made in the interest of what in very polite phrase is called "economic pressure," most of the people of Kansas were soon out of coal. In two weeks we closed the schoolhouses and the business houses closed. There was suffering in the homes and some suffering in the hospitals.

I asked the Supreme Court to turn over to the State the custody of some 300 or 400 coal mines, in order that we might produce coal for the people who would suffer otherwise. I shall never forget the look of surprise that came over the face of Chief Justice Johnson, who has been at the head of our Supreme Court for forty years. He asked, "What allegation will you make on which to take these mines over?" I replied, "Judge, any allegation you think will work."

Although I am credited with considerable courage in straightening out that strike at the coal mines, the first and great credit for courage in that matter belongs to the Supreme Court of the State. The judges of that court did not hesitate to do a needful thing merely because it had never been done before.

After we took over the mines I pleaded for a week with the miners to go to work for the State, realizing they would not go to work for the operators. I offered them increased wages and guaranteed that whatever benefits came to them out of the controversy, going on there at that time between their officials and various of the operators, the benefits would be retroactive. In justice to the miners I think that many of them would have been glad to go back to work when I placed before them the picture of suffering that would ensue in case they did not do so. But they entered the plea that unless the president of this district ordered them back to work they could not return. Later, when the strike had been broken, one man who had remained loyal to his task was blacklisted and driven from the district.

When we took over the operation of the mines I called for volunteers to dig coal. I was not concerned at that moment in the justice of the fight between the operators and the miners. I was concerned only for the relief of the public. Within twenty-four hours more than 11,000 people in Kansas had volunteered.

From among the volunteers I selected several hundred young men to man the mines, men who had been in service overseas. I had seen them over there overcoming obstacles of great difficulty, so that when I heard the district president of the miners' union say that not a pound of coal would be produced in that district except by union men I knew that the district was in for a surprise.

The morning when the first trainload of volunteers arrived in Pittsburg the miners were assembled at the station to give them a proper welcome. When the miners realized that they were a group of good-natured young Kansans, who had come there to relieve the emergency of the public and not to take part in a labor war, they received them in silence.

Well, these fine Americans went to work, and that night, while they were throwing out the guard line, they began to pump the water from the pits. The next day, against obstacles which seemed to be insuperable, at one of the mines they had produced a carload of coal. The next day they mined ten carloads of coal, and on the next day thirty. In ten days these young chaps, who had never seen a coal mine but who were trained in all the fundamentals of American belief in American justice, had produced enough coal to relieve the emergency in more than 200 Kansas communities that were suffering from lack of coal.

But as these boys were performing this great task they did another thing, fundamentally of greater value even than the coal we needed; they arrived at the conclusion for themselves and for all of us that the State has the right to protect the public against anybody's strike in an essential industry.

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*Abstract of address delivered before American Electric Railway Association, Atlantic City, N. J., Oct. 13, 1920.

THE ESTABLISHMENT OF THE INDUSTRIAL COURT

Next a special session of the Legislature was called to deal with the situation and to write into the statute that the paramount right is the right of the public. After suggestions had been received from all quarters and considered a law was passed essentially as originally drafted. It was passed almost unanimously. It has since been held to be constitutional by the Supreme Court of the State. It is the law of the State, and everybody expects that it is to be enforced just as every other law in the State is enforced.

It may be said that we have taken from labor the only weapon it had, its right to strike. If we had taken away from labor that weapon and had provided nothing in its place we should have had a very unjust law. But every one of us must realize that the history of progress in our day is the history of the better condition of the workingman. It is true we have taken from him in Kansas the weapon of the strike, but we have given him for use in every honorable controversy a more dependable and usable weapon; we have given him the backing of the State government, and it is the first time he has ever had a weapon that will do business.

Down in the Pittsburg district, where the need for this legislation first occurred, there had been in the forty-five months that preceded the writing of the Kansas court bill 705 strikes at various mines, which cost the miners more than their victories brought in. Surely, the strike, the weapon that cost the men so much and can do so little, is not so effective a weapon as the weight of justice guaranteed by an impartial and righteous government.

RIGHT TO LOAF NOT NECESSARILY SACRED

Out there the most frequently uttered misrepresentation of the law is that it takes away from a man his God-given right to quit work. What the law really says to a man or to a group of men is: "You may quit work whenever you wish, but you cannot come here tomorrow with your pockets full of dynamite, to keep from working this group of men who wish to continue on the job." The right to work is just as sacred as the right to loaf. The court holds that the basis of industrial business is founded upon collective bargaining, and when there is any effort to get together through conciliation and arbitration, the court encourages it. But when a strike threatens the public, then the court steps in with its substitute for the strike, and for the protection of the public it says that these industries shall keep functioning while the justice of the matter is being determined. That is all there is to it.

A man representing railroad labor asked me the other day: "Why don't you put on the court a representative of organized labor?" I answered: "For the same reason that we did not put on the court a representative of the employing capital." If a representative of organized labor, a representative of employing capital and a so-called representative of the public had been put upon this court should we have had a court of justice? No, we would have had a board of arbitration. We have discovered in the last sixty years of trial that arbitration does not work; or if it does work, it does not do any good. A board of arbitration does not properly care for the rights of the public, which in all essential industries is justly concerned in a quarrel which it was not responsible for bringing about. We have discarded arbitration and established a court of adjudication, comprising men appointed because of their impartiality, their justice, their honesty. Their justice, honesty and integrity are guaranteed by a responsible government. We have appointed them upon the broad principle that the public, labor and capital are entitled to protection.

They say our plan is regulative. Well, we are all regulated, or ought to be, but we never realize it until we come to the point where regulation hits us and we realize we are in a government of law and that liberty does not mean license.

Why, government regulates us from the hour we are born until the day we are buried. How absurd it is to presume that government may not also find justice for labor and capital in the quarrels of which they have made the public the victims during the last fifty years in the United States.

As I see it, we have based our law upon the oldest principle of state government and there never was any question as to whether we could do this. There is no difference in the classes of quarrels; there is merely a difference in their names. There has never been any reason why government should not supply justice for the laboring man and for the employer in those quarrels. The reason why that action has never been taken is that statesmanship has not dared to brave the wrath of the classes on either side. The fundamental principle has been there since there has been an organized society.

COURT HAS DECIDED SEVERAL RAILWAY CASES

If we are going to have protection, there must be a guarantee that justice shall go with that protection. In Kansas, where we have substituted impartial adjudication for the strike, or arbitration that precedes the strike, we are getting good results. The court has been in operation four and one-half months. We have decided over a dozen cases brought by the heads of organized labor. We have decided some cases brought by capital, but organized labor has made more use of the court than capital has.

Our first one was an electric railway case.* The interurban system known as the Joplin & Pittsburg Railway had two expensive strikes in the last three years. In 1918 there was a strike that brought the company to the verge of a receivership, and cost the public untold millions. At the end of ninety days the strikers came back and solicited from the employers the privilege of going back to work under the old wages and under the old conditions. When the court had been established, the president of the Kansas Federation of Labor asked for a living wage for the men. Then the presiding officer of our court called his attention to the fact that that is a line of language which we do not use in the Kansas Court of Industrial Relations. The law says that every such man is entitled to a fair and just wage and wholesome place in which to work. What is a living wage? It is a wage sufficient to meet the costs of subsistence. What is a fair and just wage? It is a wage sufficient to meet the cost of subsistence, plus sufficient to give the laboring man an opportunity to enjoy for himself and his family some of the various forms of modern civilization, plus sufficient to enable him with reasonable frugality to build up a safeguard against sickness and old age. The court awarded a fair and just wage, but the railway said that while it would have to grant this wage it would not have enough money to pay it." The court, then, after analyzing conditions in the district gave to the railway sufficient increases in freight and passenger rates to enable it to meet the obligation of the new order. The public, which would not have been satisfied with the results of a strike, the public, whose attitude probably kept the railway from raising rates, accepted the order with satisfaction.

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*See article in issue of ELECTRIC RAILWAY JOURNAL for May 15, 1920, page 1013, for details of this case.

In the case of the Topeka street railway there had been strikes without effect. When the Court of Industrial Relations was created the motormen petitioned for an increase. The increase was given them and they were satisfied. The street car company officials said that they would try it for three months, but thought they could not carry the burden. Later the court, taking their condition into consideration, increased passenger fares, and now nobody is opposed to the arrangement. The organization is functioning and the public is satisfied.

The following incident shows the curative effect of the court. At Goodland there was an open car shop. For thirteen years the employees had been trying to get the Rock Island Railroad to inclose it. It was out on the plains where the wind blows violently at times. It was no place to have an open shop of that kind.

In 1905 the railway employees got a bill through the Kansas Legislature requiring every railroad company to inclose its repair shops, but through a technicality it was not effective. Then the Court of Industrial Relations was created, and after considering that every man is entitled to a healthful place in which to labor it took up this case on application of the employees. It took just a week to try the case, and the railway was ordered to inclose the roundhouse and have it ready by a certain date.

SOME OPPOSITION TO THE INDUSTRIAL COURT

Society is formed in three layers. At the top 2½ per cent represents the employers, at the bottom 5½ per cent represents the employees, and in between 92 per cent represents a good-natured protoplasmic mass, having no power of self-defence except the good-natured powers of natural resistance, and then at the top and bottom begins this economic pressure. Out in Kansas the 92 per cent have come out and said the hitherto submerged nine-tenths of the population is going to fight for itself under the protection of government.

Out in our state some labor leaders are advising the defeat of every candidate for the State Legislature who voted in favor of the industrial court bill, and the support for Congress of the men who will represent the cause of labor. Do we want that sort of Congress, a Congress of men not representing the country, but representing the group? If not, the challenge to America at this hour is to hold fast to the political type of government and to meet the challenge of any class that thinks it can live above the law. Why do the labor leaders fight these laws? They fight them because labor leadership realizes that if government may find justice for the laboring man in his quarrel with capital then there is no need any longer that the laboring man should pay out of his pockets every week a share of his wages to support those who live off labor.

It is my belief that this law will give a new atmosphere, a new moral tone and functioning power to organized labor. In the first place, it removes that which is the very worst thing about organized labor, its feature of compulsory unionization. It leaves the laboring man free, and that is what we want. It only takes away the power to start a civil war when he does not get what he wants, or when somebody else does not get what he wants; when somebody in Seattle falls off a dock and Seattle goes on a strike and a group of men strike in Atlantic City through sympathy.

It does away with the far-flung system of making class war upon the public, and it leaves to them the power they may use through their solidarity when they come into what they call collective bargaining. We say to labor: "You shall have your solidarity for proper purposes, to increase the good of those who labor with you. But when you come into certain communities that are 100 per cent against you you realize in those communities that you have not secured the best expression of brotherhood."

A poor woman came to me to my door with all the earmarks of hopeless poverty. She said, "I spent all the money I had to come in here from Weir City to tell my troubles. My husband is on strike and has been on strike for six months, but he does not know what the strike is about. We have tried to keep the family alive on the strike benefits of $8 per week, and when your volunteers came down to the mine I went to see if I could get some mending to do for the men. I brought home a lot of it, but last night a committee from my husband's union called on me and said that I was not to do that work and could not go back to the mine." I said, "Go ahead with your work, and I will see that they do not molest you." She said, "I cannot do that because when you go away they will burn down my house." Surely a government may foster a better spirit of brotherhood than that.

What we are hoping to do in Kansas is to give to labor a new hope and to the public a new sense of protection. The temper of labor is growing mellower over the operation of the court. The other night I spoke in my State in a great railroad center. Many of the public men were nervous about the attitude of labor, but we had a wonderful meeting, and I explained to these railroad men what this law will do for them. All reasonable men, whether they belong in the ranks of capital or labor, realize that we are working under modern conditions and that all the elements of manufacturing, production, transportation and distribution are mixed together in a common machine; that a break in one part of the far-flung machinery breaks down the whole public relations.

I hope the railway men, who represent powerful interests in their communities, will get acquainted with the members of their legislatures and insist upon the provision of industrial courts by the legislatures of their states. This legislation is bringing forward that day which will place in the right relationship the whole body politic, the subject of industrial quarrels. Several states plan to have industrial courts and the movement is spreading.

The day is here for this legislation. The program is simple and the foundation ample. All that is needed is to get the politicians away from their dread of the labor leaders.

The Problems of Coal Supply*

By Eugene McAuliffe
President Union Colliery Company, St. Louis, Mo.

Storage at Point of Consumption Will Improve "Load Factor" of Fuel Production and Distribution—National Legislation Providing for Seasonal Variation in Coal-Haulage Rates Would Encourage Uniformity of Demand for Coal and Reduce Mining Costs

As A people we are slow to see great changes in the making. We long ago came to the conclusion that coal was plentiful and cheap and classified the fuel problem as one easily to be disposed of. Of late, however, the job of fueling an electric railway, a power plant or even a modest household seems to offer some difficulty. The unexpected and grievous interruptions in supply and the startling increases in the cost of coal experienced during the past three years have aroused greater attention and have forced some measure of understanding of the vital importance of the coal industry. Appreciation of the problems of coal production and distribution must become still more general and the co-operation and interest of all users must be obtained if we are to secure a solution of these problems and any permanent improvement in the conditions that surround our coal supply.

In 1870, five years after the close of the Civil War, our annual coal production of all grades was 0.857 ton per capita, while in 1918, less than half a century later, it had increased to 6.44 tons per capita. During 1919, notwithstanding the falling off in business after the armistice and the loss in production due to the five weeks' strike in the fall of that year, our per capita consumption was 5.17 tons. To this extent and at this rate has coal grown into our national life. Any interference with the production of coal, however occasioned, is reflected immediately in the activity and earnings of the thousand lines of endeavor dependent upon it. To men so thoroughly aware of the facts as electric railway men are it is unnecessary to enlarge upon the magnitude and the fundamental importance of the coal industry, nor do I need to emphasize its vital relation to their own business. Electric railways use a large and growing proportion of all the coal produced and its cost to them is a very heavy share of their operating expenses.

THE SITUATION AS IT EXISTS TODAY

Our present chaos is due to causes which are always at work in the coal business, but which have operated in aggravated form during the last twenty months—a depressed and waiting market, with coal stocks deliberately allowed to become exhausted, followed by (and in large measure the cause of) the most protracted and widespread strike that the industry has experienced since 1910, when 215,640 out of a total of 555,553 men employed in bituminous coal mining lost an average of eighty-nine days each, or 19,234,785 man-days. The facts are so little understood as to warrant their brief review. Let us therefore go back to the bitter experiences of the winter of 1917-18, now largely forgotten, when the Fuel Administration found it necessary to issue orders partially suspending the use of fuel. From this experience and the urgency of the war demands came a vigorous campaign to increase coal production, in response to which the mines of the country during 1918 produced 579,385,820 net tons of soft coal and 98,826,084 net tons of anthracite—by far the greatest tonnage ever turned out in twelve months. Of this amount, 550,000,000 tons of soft coal were consumed or exported and about 30,000,000 tons surplus were added to storage stocks.

After the signing of the armistice in November, 1918, and during the mild winter which followed, the demand for fuel slackened and the coal industry entered a six months' period of poor market and low production, from which we have not yet recovered and which laid the foundation of our present shortage and confusion.

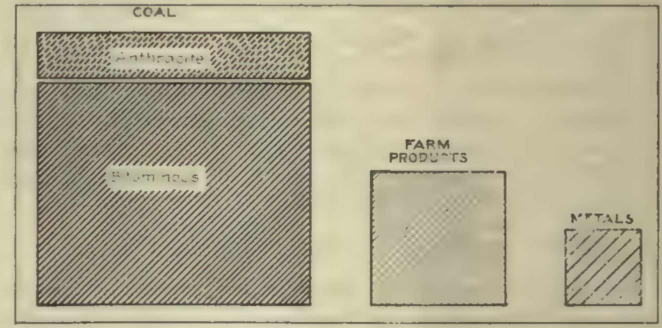

FIG. 1—COMPARATIVE WEIGHTS OF SEVERAL BASIC COMMODITIES PRODUCED IN THE UNITED STATES

We entered the year 1919 with about 30,000,000 tons of bituminous coal in reserve and with the opinion prevailing among buyers that prices of coal and other commodities would at once decline. During the spring of that year the Railroad Administration unfortunately entered into a controversy with the coal operators over contracts for the ensuing year, the former insisting upon a lower price and the re-establishment of the policy of "assigned cars," and the operators demanding the prices previously fixed by the Fuel Administration, while public utilities and other buyers awaited the outcome of the controversy. Meanwhile the railroads and other consumers were using up their reserve stocks, 250,000 open-top cars stood idle on sidings for lack of traffic, and the coal miners became daily more and more restive, due to the fact that in many instances they could work but one or two days a week. This was the gestation period of the strike of Nov. 1, 1919. Toward the middle of the year, as mutterings of the coming mine-labor storm became audible, every consumer sought to buy; by July 15 the car surplus was exhausted and in August a car shortage existed from southeastern Kansas to Roanoke, Va. This outcome had been clearly foreseen by the operators, and their national association, in good faith, outlined and attempted to carry on an advertising campaign to stimulate buying, which, however, was discontinued early in the summer largely because of the criticism leveled at it by officials of the Railroad Administration. In July, for the first time, orders became available and the mines worked steadily for three or four weeks until the car shortage developed, this shortage continuing until Sept. 15, when cars in adequate numbers were again furnished preparatory to the strike.

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*Abstract of address delivered before the American Electric Railway Association, Atlantic City, N. J., Oct. 12, 1920.

On Nov. 1, 1919, came the coal strike which lasted until Dec. 12; during this time soft coal production fell behind about 42,000,000 tons and the 30,000,000 tons in reserve at the beginning of the year had been largely consumed. The year 1919 closed about 30,000,000 tons short of a safe supply, or about 6 per cent of the estimated consumption for the current year. During the first six months of 1920 we fell still further behind, chiefly because of a continued shortage in car supply, which was greatly aggravated by the strike of railroad switchmen. I do not hesitate to say that the publicity given to the quarrel between the Railroad Administration and the coal operators, which encouraged the general public to refrain from purchasing fuel and to burn up their reserve stocks, was the last pound which sunk the industry in the morass of strikes, with their attendant disregard of contract obligations, defiance of law and economic loss, from which we are still suffering.

As intimated above, the present situation had its origin in adverse conditions which are inherent and chronic in the industry, and it is to these conditions that I wish chiefly to direct attention in this paper. They are fundamental and general and they cannot be cured without the assistance of the entire buying public. The operator by himself can do little. The permanent remedy of these conditions will require the co-operation of the operators, the railroads, such large buyers as the members of the American Electric Railway Association, and some governmental or other agency to correlate their efforts.

THE JOB IS A BIG ONE

The magnitude of the coal problem has always been underestimated. A comparison of the coal requirements of the nation with the aggregate tonnage of small grains—wheat, corn, oats, rye and barley—plus our potato crop, presents this vital subject in a new light, and comparison with the tonnage of our basic metals also offers food for reflection. The relation of the weights of these products is shown in Fig. 1, herewith.

The coal tonnage amounts to 310 per cent of the combined weight of the grains, the potato crop and the basic metals. The data serve to reveal the enormous physical proportions of the coal business and to give us some idea of the task which the transportation of coal imposes on our railroads. The movement of coal is the largest job confronting them and it constitutes more than one-third of their total ton-mileage.

The coal industry produces an essential commodity for which the year's demand can be fairly well predicted, and it has always attracted sufficient labor of good grade. Why then has it suffered such frequent disruption and difficulty? Chiefly on two accounts: (a) The demand is extremely variable and the mines run under an exceptionally bad "load factor," (b) the industry cannot store any considerable portion of its product and it must have, day by day, an adequate supply of cars to take away the coal as it is produced.

From these two conditions arise all the other difficulties of the industry — overdevelopment, unattractive labor conditions and strikes, unreliable supply, high and variable production costs and unstable prices.

While, of course, demand and production are interwoven as they are in all business and react on each other to some extent, there are inherent seasonal variations in demand which have no relation whatever to the ability of the mines to produce. The mines of the country could work at a fairly uniform rate throughout the year provided their product were regularly taken away. What actually happens year after year is illustrated in Fig. 3, which applies to the four years preceding our entrance into the war and in which the wide seasonal variations are clearly shown. The conditions during the two pre-war years, 1913 and 1914, are the most typical. The conditions prevailing during the following four years are illustrated in Fig. 2. It may be noted that in 1914 the production for March is 123 per cent of the average, whereas the minimum production immediately follows in April and reaches only 68 per cent of the average, and speaking generally for the whole industry the minimum monthly demand is only two-thirds of the maximum demand.

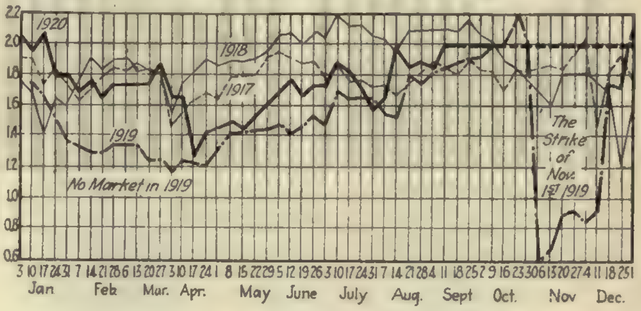

FIG. 2—RECORD OF COAL PRODUCTION IN THE UNITED STATES

STORAGE AT THE MINES IS OUT OF THE QUESTION

Storage at the mines is frequently suggested as a remedy for the poor load factor, but there are few mines provided with storage and rehandling facilities for even a few days' supply. Storage at the mines on any large scale is out of the question, quite aside from any consideration of the cost of providing storage facilities. It would entail the storing of enormous stocks of coal at a few points, and the danger and expense arising from fires would be vastly greater when in relatively small storage piles at the numerous points of consumption. Furthermore, mine storage would result in the degradation through weathering and rehandling of a far larger proportion of the country's coal supply than is entailed by storage at destination. With mine storage piles in general use, the mines would inevitably pass through them more than just the amount necessary to even off the peak of the load, for instead of loading from storage only during the time of maximum demand, they would undoubtedly have to do so to a considerable extent at other times in order to minimize undue weathering and fire risks. Again, there are hundreds of mines throughout the country at which there is not adequate space for storage.

Serious as are these objections, they are less important than the fact that storage at the mines would in no sense solve our present transportation problem.

The railroads suffer as much as the mines from their present badly distributed load; the number of open-top cars, the capacity of tracks and terminal facilities are all inadequate for their winter peak load, nor would it be sound economics to require them to provide facilities adequate for four months' maximum traffic, a large share of which would have to lie idle during the remainder of the year. We should, if possible, try to move more coal during the summer than in the winter, for the summer is not only the time of low transportation load, but the cost of train operation is very much less under the favorable weather conditions which then prevail. These considerations constitute by far the most serious objection to the widespread storage of coal at the mines. Coal production and transportation are inseparable and the permanent remedy lies not in producing and *storing* during the summer months enough coal to provide for the peak of the demand, but in producing, selling and *transporting* during these months enough coal to supplement normal production during the four months of the winter.

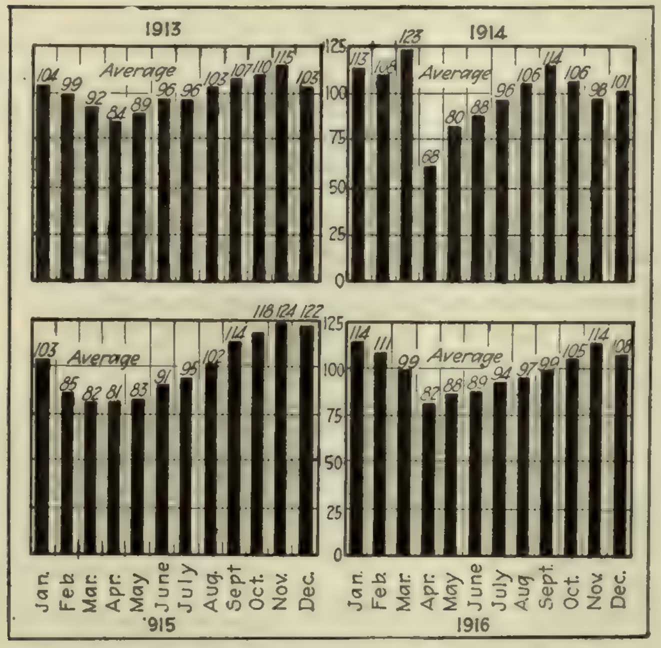

FIG. 3—DIAGRAM INTRODUCED TO SHOW SEASONAL VARIATIONS IN COAL SUPPLY CONDUCING TO HIGH MINING AND DISTRIBUTION COSTS

If we admit the impracticability of general storage at the mines, it follows as a matter of course that they must have day by day enough cars to carry off their day's production. Car supply is therefore the determining factor in coal production. There are always periods of the year when cars are unavailable in sufficient numbers and there are frequently periods when car shortage is serious and widespread. This chronic deficiency in car supply has been for years the subject of mutual recrimination between the operators and the railroads. We shall never have a steady and adequate car supply until we get a proper conception of the magnitude of the coal tonnage and lay down a definite program for leveling up the general load on the railroads.

Another factor in the situation, closely related to car supply, which still further impedes mine output, is the coal-car distribution rules which prohibit a mine from loading coal during more than one shift per day, even during the mine's development period. These rules, promulgated by the United States Railroad Administration, were originally advocated by mine owners whose properties were being strangled by labor union legislation and who sought to deny double-shift working to competitors in non-union fields. I know of no other industry which suffers under such a disability, and I do not believe there is sufficient warrant for transportation authorities to deny the producer the privilege of loading coal during any hour of the twenty-four, if the demand is heavy enough to warrant working two shifts.

IRREGULAR WORKING INCREASES MINE COSTS

Superimposed on the loss of output due to variable demand and the lack of cars is the loss occasioned by the voluntary absence of the mine workers at times when cars are available and when the opportunity for work exists. This loss—one of the internal problems of the industry—is a serious obstacle to low mine costs and to the welfare of the individual miner. There are very few mines in which the average number of men absent does not amount to 10 per cent, and at many mines this average ranges from 16 to 30 per cent. This bad habit arises, in part at least, from the example and influence of irregularity of operation due to causes beyond the workers' control, and it constitutes a serious drain on output.

The cost of production is increased by such irregularities in working time and output as have been cited above. As in any business, the heavy fixed charges run on, and there are important items of operating expense and maintenance which must be incurred whether the mine is producing or standing idle. The amount by which lost time increases the cost of production is strikingly shown by a study of this matter made during 1917 by the engineers' committee of the United States Fuel Administration. This dealt with cost data covering a period of twelve months and derived from seventy-three mines located in the New River district of West Virginia. It discloses the increases in the cost of producing coal occasioned by an insufficient car supply, shown in Fig. 4.

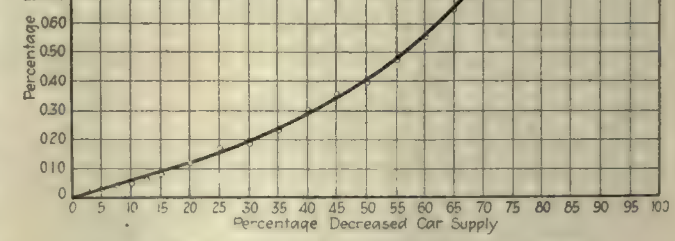

FIG. 4—RELATION OF RAILROAD CAR SUPPLY TO COST OF COAL

Irregularity in working time due to variations in demand and deficient car supply is chiefly responsible for the unsatisfactory conditions of mine labor. There is no other great industry in which the workers are so constantly subjected to such variations in the opportunity to work and in their earning capacity. The number of working days lost each year from 1913 to 1919 for each of the mining regions of the country is shown in Fig. 5. The days lost include the idle time due to lack of demand, lack of cars, and all other causes except voluntary absence on the workers' part; that is, the chart shows the number of working days that the miners were compelled to miss. For the whole bituminous industry, during these seven years, the least number of days lost in any field was thirty and the maximum 145; conditions in the anthracite region were better.

The economic and sociological effects of such conditions are obvious. They lead to periodic hardship, they foster discontent and exorbitant wage-scale demands, and they are the basis of most of our mine strikes. They are responsible for the fact that mine workers are migratory and unstable; forced to be idle a quarter of their time, they seek other fields or leave the industry. Mine workers as a class are renters, rarely establish permanent connection and eat up their income in moving, rents and perpetual buying on expensive installment plans.

The frequency with which mine workers resort to the strike weapon has become appalling. There are two distinct forms of striking; one the result of orders emanating from the general officers of the union, such as that which took place on Nov. 1, 1919, the other the lawless strike at individual mines, more recently camouflaged as a "vacation." There is a grievous lack of integrity and discipline within the ranks of the mine workers, and the internal workings of the individual local union, as well as of the parent body, are not infrequently dictated by a few individuals of American nationality or British origin who ruthlessly overwhelm the more staid foreign element, which is frequently unjustly reported as lawless and lacking in the qualities that make for good citizenship. I speak plainly when I say that the rivalry for office that exists within the union's ranks has not only menaced all organized labor but has not hesitated to threaten and menace society. The complacency with which this situation has been viewed by the public at large largely absolves the coal operators from the charge of indifference to the evils that flow therefrom.

As a people we know too little of the industry and its inner workings; we do not adequately sense its vital relation to our economic welfare; we have been little concerned with the causes that inspired the building up of the strongest single labor organization in the country, the United Mine Workers of America. This union, which in 1897 had a scattered following of only 9,737, now has a membership upward of 615,000 men of diverse nationalities and varying degrees of intelligence, who carry out the orders of their officers with an obedience sometimes worthy of a better cause. Its strength has not always been used unselfishly and wisely, but many of its acts have arisen from indefensible conditions within the industry, some of which still persist, and the responsibility rests with the operators, the heads of our transportation companies and the public to remedy these conditions.

THE MINING INDUSTRY IS GREATLY OVERDEVELOPED

Some of the conditions thus far outlined have encouraged an overdevelopment of the industry and the mining of much coal which would better have remained in the ground. The bituminous mines of the country have a potential annual capacity of from 675,000,000 to 700,000,000 tons, which is about 125,000,000 or 150,000,000 tons in excess of our present needs. The bulk of this capacity is in permanent mines of good size. The overdevelopment is largely in permanent facilities which represent an investment in excess of $2.50 per ton of annual output.

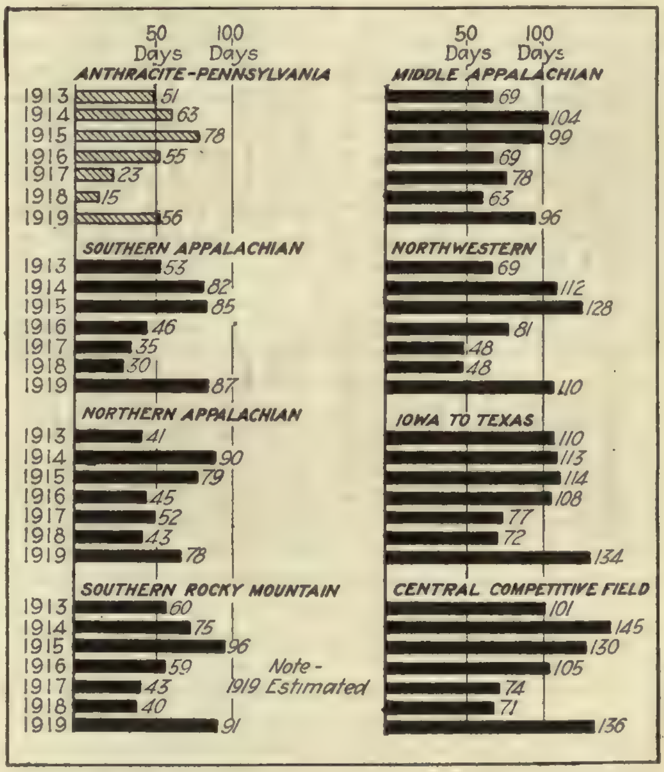

FIG. 5—LOST TIME IN COAL REGION FROM 1913 TO 1919

The conditions have encouraged, also, the development of so-called wagon mines, the operation of most of which may be characterized as a public nuisance. While they constitute nearly a third of the whole number of mines in the country, they produce less than 2 per cent of our coal, and they not only disturb labor and market conditions but they also pour out in times when demand is brisk a product which is largely unfit for use.

Less complete statistics compiled by the Geological Survey indicate that during 1918 production reports were received from 2,719 small mines (very few of which were equipped with tipples) whose total contribution to the coal production of the country was 1,108,000 tons, or an average of 406 tons each, per year. A summary of the 1918 reports shows that there are not less than 3,300 small so-called country banks and local commercial mines, producing less than 3,000 tons each per year.

The 5,888 small mines producing less than 2 per cent of the nation's bituminous coal in the year 1917 can be best compared to the jitney competition from which the electric railways suffer. These small openings, like the jitney, come out of their hiding places only in times of coal shortage and excessive prices. Instead of relieving the situation, they aggravate it by offering, for short periods, high rates of wages, which draw the migratory element in mine labor away from competent and well-equipped mines where their output would be more than twice as much per man. These small mines also make a demand on railroad facilities out of all proportion to the number of loaded cars which they ship each day. Their cars, placed one at a time, frequently absorb the limited space available on congested team tracks, delaying the placing, unloading and removal of general freight for which such tracks were built. With the disappearance of coal famine and high prices, the wagon mine operator takes his team or truck to the barn, balances his accounts and seeks new lines of endeavor.

Not only do these small mines absorb an undue share of our labor and transportation facilities, but they turn out a grossly inferior product, containing often a non-combustible content reaching 40 per cent. Improper preparation of coal is one of the great sins of the industry and the wagon mine is not the only offender. The bituminous coal produced in 1917 showed that about one-third of it contained 5 per cent of non-combustible material that could readily have been removed. An improvement in preparation took place during early 1919 when the demand was slack, but quality deteriorated again during the six weeks preceding the strike of last fall, and this unnecessary tax on transportation and the industries continues unabated at present.

CONDITIONS OF MINING ARE UNDERGOING CHANGES

State and Federal enactments, resulting from the growing demand for better mine labor conditions, have multiplied the cost of developing a permanent and dependable coal property. Furthermore, notwithstanding the enormous tonnage computed as still remaining in the ground, the opportunities for securing a location for a coal mine which will stand competition are rapidly diminishing.

During the twenty years preceding 1917 the coal industry presented a sorry spectacle. It was overdeveloped, its employees were underpaid and mines were opened and operated without due regard to the safety of the workers. The record of disastrous explosions and accidents is a dark page in the history of mining. The sharp competition invariably existing between individual mines and between mine districts was largely responsible for such conditions and for their continuance. When the operator decided that a certain tonnage was necessary to enable him to run, he frequently accepted orders for it at less than the cost of production, and then went back to his employees with the request that they consent to a cut in wages—already too low—to enable him to break even. Such an arrangement, when put into effect, was frequently followed by a secret freight rate agreement through which the operator received rebates that represented his total margin of profit. After the Mine Workers' Union became strong enough to enable it to refuse these temporary wage reductions and anti-rebate legislation closed the door to relief in that direction the operator turned to the "recurring strike," frequently prearranged for a definite period, in order to create the return that would enable him to pay interest on his paper, which the banks were carrying to the point of saturation.

I am reviewing this period to illustrate the ways in which instability of the industry operates to the disadvantage of all concerned and to emphasize the point that coal should be produced and marketed under conditions which promote the health of the industry, justice to the public and the welfare of the workers and their families. Every ton of coal produced should bring in a margin above the cost of production sufficient to create an adequate return on the investment, with due regard to the hazards of the business. With such a return assured, exorbitant prices should be discountenanced and prohibited.

The limits of the area underlying the so-called smokeless coals are now well defined, and this coal, which under former freight rates and low costs of production was shipped far afield, must now be conserved for a market located east of the Appalachian range, including the navy and the merchant marine. The Northwest, which heretofore has absorbed a large tonnage of smokeless coal, has definitely and permanently turned to bituminous coals produced nearer the points of consumption. England, which hitherto has enjoyed the world's coal export trade, has suffered an extraordinary loss of production and increase in unit production costs as a result of conditions largely chargeable to the war and a large share of her former trade is bound to come to us. We must, therefore, prepare to supply a material portion of the Western Hemisphere with coal. The South American republics are practically without coal of their own; they are growing rapidly in wealth and population, and it is not unreasonable to suppose that their consumption of fuel will increase at a rate comparable with the growth in consumption in our own country during the past fifty years.

SOME REMEDIES ARE AVAILABLE

While I am not prepared to offer remedies for all the ills found in the foregoing diagnosis, I wish to offer my opinions as to what should be done to cure the more fundamental troubles. There is much to be done within the industry itself, but the more important defects require general and national treatment.

The purely mechanical problems of coal mining have not reached their final solution; while we have a considerable proportion of finely equipped properties operating under modern methods, there is room for improvement even in them. We should have larger individual mine openings, hand mining should give place to mining machines, electric drills and mechanical loaders and heavy underground tracks, cars and electric locomotives should, as far as possible, replace animal haulage. The economic and social aspects also need improvement. The men must have more regular employment; their lives must be adequately safeguarded, and they must be given the opportunity for, and be taught the advantages of, better homes, a more liberal education, industry and thrift.

Under old freight rates and the play of unrestricted competition between mines and among railroads there has grown up a system of coal distribution which places an undue burden on our transportation facilities and an unnecessary tax on the public. A large proportion of our coal moves long distances over the country, without regard to the relative location of the consumer and the mines.

This practice is a great tax on our railroad capacity and a drain on railroad income. Freight rates have frequently been made for coal which do not reimburse the carrier for the cost of hauling it and the deficit of course has to be added to the general freight rates. The public suffers not only through the unnecessary clogging of the railroad machine, but through this increase in the general rate level, and under our new railroad legislation no one can escape some share of the general increase in the cost of transportation which this haphazard scheme of distribution causes. We have recently had two radical increases in coal freight rates, one of 25 per cent and the second of about 40 per cent, making a total of approximately 75 per cent. These increases, because they are on a percentage basis, will of course automatically operate to diminish the evils of excess haul, and they will force many consumers to consider carefully the coals near at hand, but the radical cure can only come through some general plan of distribution and control of freight rates. Gradually and without violence to establish business interests a system of coal market zones should be built up through the medium of rate control. Excessively long and overlapping coal hauls should be penalized; the last two or three hundred miles should bear a prohibitive rate instead of being given away, as the carriers have frequently done in the past.

LEGISLATIVE AID IS NECESSARY

By far the most important problem in coal supply is the equalization of the load on the mines and on the railroads, and its solution can only be effected by the consumer, who will have to equalize his demand. Just now the consumer is aroused, but he will quickly forget his present experiences. The summer of 1921, with probable decreases in the cost of living, will perhaps see mine labor tranquil and willing or even anxious to "maintain the integrity of wage contracts"; strikes will become less frequent and the public will quickly forget the experiences of the last few months. Some way must be sought to keep consumers alive to the necessity of foreseeing their needs, equalizing their demand and storing a portion of their requirements. I believe this can only be done by offering them the inducement of lower freight rates during the early months of the year.

Such a remedy requires, of course, legislative action, and to be effective this action must be taken for the nation at large and not locally. What we need is a federal law providing seasonal variations in coal freight rates. A bill establishing such variation in rates was introduced in the Senate last spring at the request of a committee appointed by the American Institute of Mining and Metallurgical Engineers. This bill, which is given in full in the appendix of this paper,* provides for increases and reductions in the schedule base rates per ton as follows:

Increases		Reductions	
Month	Amount Cents	Month	Amount Cents
August	5	February	10
September	15	March	25
October	25	April	25
November	25	May	25
December	25	June	15
January	10	July	5

The bill did not get out of the hands of the committee to which it was referred, although it held protracted hearings. I hope that it, or some equivalent measure, will be introduced and passed at the next session, and I bespeak for such legislation your support. Similar variations in cost heretofore locally applied have failed of their full effect because the consumers did not have confidence in their persistence. We have faith in our government, however, and with such a law in force throughout the country consumers would be encouraged to buy during what is now the period of low demand on the mines and railroads and to store enough of their coal to lower the demand during what is now the period of the peak load on both industries. Except in rare instances the general annual cost of their fuel supply would not be increased under the terms of such an act.

INFORMATION CONCERNING THE INDUSTRY MUST BE DISSEMINATED ALSO

Comprehensive treatment of the problems of an industry so fundamental and so national in scope as coal mining must proceed from a full knowledge of the facts, which must obviously be authoritative and above reproach.

For some years the United States Geological Survey has compiled statistics relating to production which have proved of the greatest value to the industry. This work of collecting the facts should be placed on a permanent footing and its scope should be greatly enlarged, so that the country will have available a full knowledge of the fundamental facts for the solution of all problems of supply, costs, labor and transportation in the industry.

Looking toward the establishment of an agency for doing this there was presented at the last session of Congress another bill, likewise suggested by the American Institute of Mining and Metallurgical Engineers. It provides in substance that the Secretary of the Department of the Interior shall "in person, or through such agency within his department as he may designate":

> (a) Investigate from time to time the wages, working conditions and practices, terms of employment and the living expenses of miners and other workmen employed in the coal and its collateral industries.
>
> (b) Investigate methods and processes for the storage of coal and conduct such research work as will conduce to the economical use of coal.
>
> (c) Investigate methods employed in the consumption of coal, including the distribution of coal cars.
>
> (d) Investigate the desirability of a central governmental coal purchasing agency for all coal used by the Federal government.
>
> (e) Investigate the desirability of establishing a statutory coal zoning system.
>
> (f) Examine the mines, etc., and have access to and copy any book, record, paper or correspondence relating thereto.
>
> (g) Subpœna witnesses and require the presentation of all documents used in connection with the coal mining industry, and invoke the aid of the United States courts in enforcing such demands.
>
> (h) Require operators and dealers to file statements as to costs, prices, profits, etc., and place at the disposal of any private or public board, commission or other group engaged in the arbitration, conciliation or settlement of any wage dispute such information so secured as in his opinion relates to the controversy.

This law if enacted would put the coal industry and all the facts relating to it under the close supervision of a cabinet officer, would insure their permanent collection and would place at our disposal dependable information which could not fail to contribute to the stabilization of the industry and the general welfare of the nation. With these facts in the possession of the public few issues would go to dispute, coal earnings and prices would be steadied and the way would be paved for the solution of most of the industry's labor problems.

I trust that this bill also will be introduced and passed by the next Congress, and that it will have the support of such organizations as the American Electric Railway Association.

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*Mr. McAuliffe appended to his paper the full text of this bill, S-5278, and also that of Senate bill S-4080, referred to later in his paper. On account of space limitations these have not been reproduced here, as copies are obtainable through official sources.

Utility Regulation and Rate of Return*

By Cecil F. Elmes
Sanderson & Porter, New York City

The Dual Standard of Commerce Regulation Which Affects Utilities, but Exempts Other Industries, Has No Justification on Historical Grounds or as Matter of Public Policy—Effect on Financing of Utilities Analyzed

THERE is every reason why utility securities, in the absence of undue influences, should command a wide measure of public favor. They are issued by merchants whose wares are a public necessity. The demand is, in general, less liable to capricious fluctuation than almost any other department of commerce. In the great majority of states utilities are subject to regulation by public service commissions and these commissions openly express an intent not merely to safeguard the interests of the public but to promote the stability of the utility concerns which are to give that public a high standard of service. Nevertheless, utility securities do not reflect optimism as a result of these expressions of good will. The present paper is an effort to find out why. It is not directed, in the main, to the work of the public service commissions. Rather, it is an effort to go deeper, to analyze the underlying causes of the present state of the industry.

It is infrequently observed, but nevertheless true, that utility men are today so much in a class by themselves that most of them scarcely realize how different is the authority to which they are subject compared with the control exercised over almost any other form of business. The public service commission is their court, distinct from the courts to which all other citizens may have recourse. They have an extensive and varied literature of their own, and it is interesting to note how this literature tends more and more to take present methods of regulation for granted. Methods of regulation which have just come into existence are spoken of as though centuries of precedent stood behind them.

This paper will have served a useful purpose if it leads some utility men not to assume that whatever is customary today in the public utility business is right; if it leads them to take note of how far they are subjected to treatment—especially economic treatment—different from that accorded to the general body of citizens, and to investigate, in a broad spirit, the grounds for such discrimination.

A DUAL STANDARD OF COMMERCE REGULATION

There exists in the United States today a dual standard for the regulation of commerce. On the one hand is a well-defined and compact body of precept and practice put into force by public service commissions and applied solely to those few businesses known popularly as "public utilities." On the other hand is a lack of regulation applied to every other branch of commerce, including businesses so vital to the public welfare that a serious breakdown in them might prove a national tragedy. That the public, if fully informed, might regard a dual standard of commerce regulation as equivalent to a dual standard of morality is not too much to assert. And, upon the single occasion since the evolution of the dual standard that public interest in commerce regulation became intense—during the war period—the dual standard was swept out of sight without ceremony and literally almost overnight. In an incredibly short time, with rough but effective governmental machinery, all commerce in which public interest was vital was placed under control. No distinction was raised as to whether the commodity was or was not controlled by a monopoly, or whether it could or could not be defined as a public utility. Unlimited technicalities and legal questions might have been raised, but no one ventured to raise them.

CECIL F. ELMES

How, then, has the dual standard of commerce regulation been justified or condoned? It is defended on three main grounds:

First—That the commodities dealt in by utilities are a public necessity.

Second—That utilities are, in a measure, monopolies, and inferentially, that other businesses are not.

Third—That utilities are possessed of valuable franchises derived from the public.

Each of these reasons is open to attack. If the rule of public necessity is to be our guide, why overlook bread and meat, and coal? If monopolies are the only business to be regulated, why select this limited group when so many other unregulated but equally powerful monopolies exist? If the value of franchises be the test, have public utilities been excused from regulation where the franchise is not merely valueless but a liability?

MISTAKEN IMPRESSIONS AS TO THE HISTORY OF COMMERCE REGULATION

In justifying the regulation of utilities, authorities usually, and properly, appeal to the body of legal enactment and of unwritten law evolved in England during the Middle Ages, yet the commercial history of the Middle Ages does not bear out their claims in the slightest. Not only was the commercial world of the Middle Ages entirely clear as to the economic principles upon which commerce regulation should be based, but public opinion sanctioned and demanded a much more comprehensive scheme of regulation than is even contemplated today. The principles underlying such regulation may be summarized as follows: (a) All commerce was a fit subject for regulation; (b) not only sellers were regulated, as now, but both buyers and sellers were held equally fit subjects for regulation;

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(c) the regulatory duty regarded as foremost was regulation as to the quality of merchandise, *i.e.*, the principle that quality of service is more important than its price; (d) it was understood that fluctuations were natural and must be looked for and given prompt recognition.

In Colonial days, especially in the New England colonies, there was little question as to the right of the state to set prices for commodities. Examples of general regulation of commerce during the first half of the Nineteenth Century can also be given. Such is the power conferred by Congress in 1820 upon the city of Washington: "to regulate . . . the rights of wharfage at private wharves . . . the sweeping of chimneys, and to fix the rates of fees therefor . . . and the weight and quality of bread." In 1841 the Supreme Court of Alabama decided that the city of Mobile had the power to regulate the weight and price of bread. In 1876, in Munn vs. Illinois, and again in 1891, in Budd vs. New York, the United States Supreme Court upheld the right of a state to fix rates for warehouse and handling charges upon grain. In both cases there were dissenting opinions, but they were not based upon the question of whether or not grain elevators were a "public utility," but upon the emphatic ground that price regulation of any kind is not within the powers of any Legislature.

RECENT COMMERCE REGULATION IN THE UNITED STATES

In the period which has elapsed since the case of Budd vs. New York court decisions have done little to clarify the entire question of the rights possessed by the states or the United States to regulate prices of commodities. In large measure this has resulted from a development which set in about the time this decision was rendered, and which forms an outstanding feature in latter-day commercial history. This was the formation of the so-called "trusts," the popular demand for their regulation and control and the legislative and judicial efforts to give effect to this demand. The court decisions of the last generation have, in general, not been upon the direct question whether prices should or should not be regulated. The essential question has been whether the defendant was or was not a monopoly. At first sight this appears an eminently practical question, yet the great monopoly cases before the courts in recent years have taken on a curiously theoretical aspect.

The Sherman act was passed in the year preceding the Budd vs. New York decision. Its provisions were aimed at preventing the formation of monopolies rather than in punishing commercial and economic malpractices in which they might be expected to indulge. The issue thus raised before the court being essentially a theoretical one, the action of the court in each case and the penalties imposed have been little better than theory.

Elaborate dissolutions and reorganizations have been ordered, securities have been ordered distributed, properties have been made to go through the formalities of compulsory sale. But no practical step whatever has been taken toward preventing exactions or inflated prices. The law enjoined none, the court could take none. Not a line in these important decisions makes an effective step in this direction. The court could merely harass and fetter the scheme of financial or intercorporate relationship. It is fair to say that no action taken by the highest courts within the last quarter of a century has borne fruit in lower commodity prices or had the slightest real promise of doing so. And yet this is the only tangible result in which the public has the slightest real interest.

Out of this latter-day concentration on the abstract question of monopoly, together with a general acceptance of pseudo-history and incorrect statements regarding commerce regulation in the past, there has arisen a distinctly novel and modern notion. This is the idea, prevalent among utility men, and creeping, to an extent, into recent court decisions, that there is an immemorial distinction between "public business" and "private business" and that "private business" is something sacred.

The idea is, of course, utterly at variance both with public opinion and public practice during the war period. Price regulation, under the urging of overwhelming public opinion, was distinctly and clearly enforced in the first instance, as against those very commodities, such as meats, upon which the life of the community depends. They were then and there treated as true public utilities. Public opinion was infinitely more concerned about their regulation than about some of the admitted "public utilities" of today.

In spite of the fact that this phase of regulation had behind it a degree of popular approval seldom accorded to governmental acts in any land, there are not wanting those, even in the legal profession, who feel that no such "power to govern men and things" resides within the people, the ultimate source of all governmental power. These timid brethren justify such regulation to themselves only on the ground of emergency, of its being a life and death matter. When, in December, 1919, at Indianapolis, a Federal injunction was employed to balk a strike of coal miners, they could not concede, in any broad sense, to the whole body of the people the right to take any action which, even if technically improper, might be necessary to avert widespread calamity, suffering and death. Such technical minds, when sympathetically seeking to justify so broad an exercise of public authority and public will, can only do so upon the polite fiction that this country, a year after the armistice and with its great war machine disbanded, was still technically at war.

RESULTS OF THE DUAL STANDARD

The dual standard of commerce regulation, therefore, centers almost entirely around present-day efforts to curb monopolies. There is no question as to the public desire to see them controlled. Where public opinion recognizes that conditions make monopoly essential, it is permitted only upon sufferance. Public action in giving effect to this sentiment took two forms. It passed the Sherman act. It evolved public service commissions, including the Interstate Commerce Commission.

The first of these steps has proved, upon the whole, a sorry failure. In the only direction in which such a monopoly really affects the public it may not, under the present system, be restrained at all. The second step, by the very vigor of its application, has gone a long way toward the evolution of the dual standard. No one disputes the correctness of the view that electric light or gas or transportation are "public utilities" and, as such, have a vital public interest. It is entirely fitting that they be controlled and that public interest be safeguarded, but street car lines and telephone systems, electric light or gas, important as they are, are far from being the only commodities by which we live. There are many who manage to exist without either electricity or gas. There are those to whom a street car ride is an unusual event. But to all, bread, meat, fuel and clothing are truly essential. Nothing in our economic life today justifies vigorous regulation of the purveyor of electric light on the score of being a public necessity while, at the same time, the baker is to be under no other restriction in regard to his prices or terms of business than his fancy may dictate. Neither can it be said that this anomaly corresponds to some expressed and general public opinion.

INVESTMENT ISSUES—A WELL-MEANT LEGISLATIVE BUNGLE

Out of the great concentration of capital into trusts and other combinations in the '90s and the first years of the present century there grew a spirit of unrest against indiscriminate increase of capitalization. How far the movement was justified by fact is a subject which space forbids us to consider. Let us assume for the purpose of this article that there were abuses and that it was the part of legislative wisdom to check them. Be this as it may, the fact is that an almost country-wide movement ensued, with legislation in most of the states, in regard to the issuance of capital stock. The intent of practically all such legislation is to compel a dollar of capitalization to represent a dollar of cash investment.

The laws regulating capital stock issues at first blush apply equally to every corporation. But since there is, in effect, supervision and control of utilities through public service commissions, and little or no control by anybody over other corporations, these statutes, in their working, operate to the peculiar disadvantage of utilities. Commissions have no choice but to enforce the law against a utility company and insist that capital stock issues shall represent cash investment at par. There is, generally speaking, no similar body to compel equally rigid obedience to law by other corporations.

Further, the legislation in question affects only capital stock. It does not prevent the sale of bonds or notes at a discount. The investing public naturally enough will not pay par for offerings of second quality where investments of the first class are available for less. Out of this condition has come the present state of affairs where utilities are forced, against their will, to secure capital necessary for their growth by the unhealthy device of increasing the ratio of bonds to stock.

The net result of this legislation and its enforcement has been that the only corporations effectively compelled to its obedience—*i.e.*, public utilities—selling their bonds or senior securities at a discount, as they often must, are practically debarred from selling their junior and speculative securities since they must sell them at par.

Now, however wise or prudent the regulation of public utilities or steam railroads may be by the commissions charged with this duty, the purchaser of securities has become aware that in buying the stocks or bonds of these enterprises he is adventuring his savings into a highly restricted and regulated form of commerce. In the meantime there are presented to him a great range of other enterprises in which he may invest, and as to which regulation of any kind is either nominal or substantially non-existent. All regulation operates, in his mind, substantially as a limitation or a check upon commerce. The security quotations of the day give us the answer as to which of the two groups the investor is favoring at the present time, and frankly it is difficult to see why we should express surprise at his choice.

PUBLIC UTILITIES IN THE INVESTMENT MARKET

Public utilities labor under three important handicaps when entering the money market as compared with other seekers after capital.

The first of these applies to issues of capital stock. The investing public, being free to place its money where it will, takes note of the fact, as set forth above, that the profits of the utility are subject to regulation, whereas the profits of other enterprises are not. For years the bulk of such regulation had the effect of reducing rates, thus curtailing earnings. Within recent times rate increases became inevitable; nevertheless, the spirit of the regulation remains unchanged. It is essentially directed toward making certain that utilities shall earn no more than a certain maximum and usually quite a modest one. The investing public further recognizes that while commissions may restrict the maximum earning, they have neither the power to guarantee minimum earnings nor funds with which to make such a guarantee good.

The second handicap applies to sale of short-term obligations, *i.e.*, notes. Lenders of capital and credit show a marked preference for borrowers who speedily liquidate their loans and a reluctance to accommodate those unable to wipe out their indebtedness in a reasonable time, even though interest payments are certain and there is no question as to the safety of the loan. Where utilities seek this class of assistance, it is recognized that they have scant prospect of rapidly amortizing the loan, and often no sure prospect of repaying it when due. Further, they have usually little in the way of attractive conversion privileges to offer.

The third disadvantage from which utilities frequently suffer is an unhealthy relation between bonds and stock. The investing public is quite properly accustomed to favor a low ratio of funded debt, including notes, to capital stock. Due in part to the above-mentioned features, in part to state legislation as to the issue of capital stock as already mentioned, an undue fraction of the entire growth of utilities in the last decade has had to be financed by issues of bonds or notes. A healthy balance between bonds and stocks is needed in the best interest of all; the lack of it adversely affects those seeking new capital. Changes in the legislation which brought about this condition or changes in its unequal application will be a public benefit.

PRESENT YIELD ON INVESTMENTS—INTEREST RATES

The investing public ranges in character from those buyers whose chief, indeed sole, preoccupation is security of their principal to those whose prime demand is a high rate of return, even at the expense of safety. The problem before the public utility manager is to determine the form his securities must take in the way of both safety and yield, so that he will make a sufficiently wide appeal both to the conservative as well as to the somewhat more speculative elements in the investing public. The support of both classes in due measure is essential to the successful financing of any enterprise.

Considering first the investor who places security before all, the highest form of investment available to him consists of bonds of the United States Government. These are secured not only upon the property of the body of citizens in the United States but, in the last analysis, upon the life and honor of every individual citizen. We are unable to conceive of a higher form of security which can be offered to an investor. For securities of this character, which in past years commanded rates as low as 2½ per cent, 5¾ and 6 per cent are now being offered. This would appear to establish a minimum figure, to be exceeded by all other security offerings in measure based upon their lesser reliability as compared with this maximum of safety.

Taking next the yield upon investments, the security for which is more speculative, but upon which the investor seeks for high dividends, it is more difficult to specify an exact figure. Very high figures are often quoted and frequently earned, not only in enterprises of purely speculative character but also in businesses of a solid and conservative type. From published statements of bankers and others it would appear that a yield of 25 per cent is not regarded as excessive where the investor subordinates security to the prospects of profit. These two figures, the former definite and the latter somewhat elastic, may be taken as indicating the limits of the investing market in either direction as it must be faced by the public utility manager.

As to interest rates, all money borrowed at the present time is being loaned at far higher rates than have heretofore prevailed in the money market. Time money, borrowed on commercial and other paper, which formerly commanded interest rates of 4 and 4½ per cent, today fetches 8 and 8½ per cent. Weighty testimony has been given before public utility commissions by bankers and others to the effect that public utility bonds, where salable at the present time to investors, must net to these investors not less than 7½ per cent, and will, therefore, cost the borrowing utility 9 per cent and over.

Any one who consumes midnight oil reading decisions in rate cases might fall into the error of thinking, as a result of extended treatment therein of the subject of rate of return, that commissions actually awarded and set aside a certain definite rate of return to the utility whose rates are adjudicated. In point of fact, this is not what happens. All that is definitely decided upon and awarded is a schedule of tariffs which the utility may charge for the service it renders. What rate of return will accrue to the company's investors therefrom is little better than a guess.

If the commission's guesses as to the future business and its guess as to the future operating expenses, together with the tariff schedule awarded, produce the rate of return stated to be desirable, well and good. If it fails to produce this rate of return, the company stands the loss. In spite, therefore, of any language in rate decisions specifying a desirable or permitted rate of return, this does not insure the company any such rate of return.

Assuming, however, that some rate of return has been earned and that the sum, large or small, is available for distribution, the following are the purposes to which it is devoted:

1. To meet interest requirements upon funded and unfunded debt.
2. To amortize or discharge maturing obligations.
3. So to compensate the owners of the utility for (a) their services, (b) the use of their property as to deal justly with them as merchants and public servants, and to make their enterprise sufficiently attractive so that investors and operators shall be attracted to the field of public utilities.

It will be well briefly to glance first over each of these in turn.

INTEREST ON DEBT AND AMORTIZATION OF OBLIGATIONS

The item of interest on funded and unfunded debt involves a recognition of the conditions affecting not only public utility operators but every business man who has occasion to borrow money or make use of credit facilities. Such a business man must have regard, among other items, to the following features: (a) Actually meeting his interest requirements; (b) maintaining such a margin of net earnings above mere present interest requirements as will not impair his standing among borrowers and users of credit as a class; (c) knowing the present, and intelligently anticipating the probable future money market, in order to make the best possible adjustment both in the quantity and method of his borrowings.

Failure to meet interest requirements when due requires little comment. Such failure involves not merely a collapse in the credit of the enterprise, but its financial ruin.

One of the financial customs which prudence has dictated is that the borrower shall show a margin of earnings over and above interest requirements varying in extent according to the hazards of the business. Public utility enterprises, based upon past experience, appear to require a margin of not less than twice the interest requirements. In spite of much that has been written upon this point, this margin, whatever its extent, does not form a proper criterion for computing the proper return upon the property as a whole. It is merely one of several elements which must be considered and given its due weight in arriving at a fair conclusion. If, by misfortune or poor judgment, a large fraction of its funded or other indebtedness falls due, to be refunded at a time when money rates are high, the company will suffer in consequence.

Amortization of debt is a duty, the discharge of which is only second to and almost equally essential with the meeting of interest requirements. Failure to meet this requirement subjects the utility to the same penalty of bankruptcy visited upon a failure to meet interest requirements, with the exception that, where amortization is not compelled by the terms of a mortgage or similar instrument, relief is frequently had by the renewal or refunding of the indebtedness. This is usually open to the following two objections: (a) An increase in the cost of such borrowed funds by an increase in the interest rate for money, or, what amounts to the same thing, a renewal of the load at a discount, and, (b) the distaste evinced by bankers and financial institutions toward borrowers whose loans are constantly renewed and must be carried continuously, as compared with borrowers, such as industrials, whose loans are liquidated within a reasonable time, thus releasing funds for other enterprises.

It must be recognized as a quality inherent in public utilities, as compared with other enterprises, that, where successful, there is ordinarily little prospect of a reduction in the total investment in them. A healthy utility shares in the growth of its community and is usually an important factor in producing that growth. The larger communities could not exist upon anything approaching their present scale without electric railways. The utility, and the investment in it, is, therefore, continuously growing, and this fact, which on its face should be a strong factor in its favor, may actually place it in a relatively disadvantageous condition in the money markets of the world. It may be unfavorably compared by certain bankers or investors with industrials and other enterprises in which accruing earnings may at any time be diverted to the extinguishment of debt or retirement of invested capital. Recognition of this disability is an important present need.

RETURN TO STOCKHOLDERS OF PUBLIC UTILITIES

It is essential to realize that none of the items covered in the previous section in any way compensate the true owners of the public utility. Regulation of public utilities which fails to protect bondholders and creditors will, of course, lead to ruin. Nevertheless, regulation carried out solely with an eye to protecting the lenders of funds can never bring about real success or a healthy condition in the utility business. The vast wealth of the United States, the whole fabric of its present-day civilization, did not result solely from the availability of funds for investment.

Success has sprung in large measure from the leadership of great captains of industry, ably supported by loyal organizations of copartners and workers. All of these men are free agents, able to devote their efforts, their enterprise and their capital to whatever line of activity they may elect. If in the public utility field they are cut off from prospects of gain commensurate with those which they can anticipate in other lines, it is inevitable that they and their associates will desert public utilities and betake themselves to those avenues of progress where they will obtain adequate reward. Such a result will be a lasting disaster not merely to the industry, but to the entire country.

PRESENT REGULATORY METHODS

Comment has been made above as to the present-day interpretation by the public of the powers of public utility commissions as intended for use solely in a quasi-judicial or restrictive sense. A public benefit will result from drawing attention to the fact that there is little or nothing in the laws creating public service commissions which compels action solely in such a sense. Further, this method of regulation is inherently defective in that it creates a divergence of interest between a utility's investors and its public. The public is led to regard every payment of dividends to the investor as a burden upon the price paid for service, while the investor sees in every reduction of rates an elimination of anticipated earnings. This divergence of interest does not exist. Perhaps the most revolutionary step in the history of public utilities will occur when the public recognizes that neither the spirit nor the letter of the laws creating commissions in general compels the adoption of any such methods.

Just as soon as regulation passes from the stage of merely limiting earnings to the wholesome stage of offering continuously expanding earnings in return for continuous improvement in service, including rates, public utility securities will begin to command a high degree of public favor. With regulation of this character they will deserve this favor, because they will combine the solidity and conservatism inherent in the public utility business with that prospect of reasonable increase in earning power which every healthy business must have, and these two qualities will make them ideal securities in the eyes of investors.

It is to be clearly understood that nothing in this section, or anywhere in this entire paper, in reference to public utility commissions, or their practices, is written in either a critical or a hostile sense. Everything contained herein is offered solely in a spirit of constructive criticism and with a full recognition that these bodies are acting fairly and with wisdom in dealing with the difficult task before them today. Some may feel that the commission might have been more indulgent to the utility companies, but plenty of others will be found to regard them as having been, if anything, overindulgent. The truth is that they have acted wisely and with intent to be fair. Our troubles lie, in considerable measure, beyond their reach. Only an enlightened and instructed public opinion will cure them.

CONCLUSIONS

The extensive ground covered in the foregoing pages may be summed up as follows:

1. Setting aside commerce regulation during the war period, utilities are today completely regulated, and practically all other industry is unregulated. The grounds alleged to justify this are wholly unsatisfactory.
2. Educational specialization, the existence of separate tribunals for utility matters, and other elements tend to make many utility men ignorant of or indifferent to this discrimination against them.
3. Wartime universal regulation of commerce, including prices, had hearty public approval. Some find it necessary to invent technical excuses for this regulation; the general public does not. The policy had the public's hearty support and so would a continuation of it.
4. The present custom of regulating only utilities is defended on alleged historical grounds, particularly as to commerce regulation in the Middle Ages and the practices sanctioned by common law.
5. Actual research into this period proves that much of this pseudo-history is directly contrary to the fact. Commerce regulation was then complete, nation-wide and highly developed. Regulation in this country in the seventeenth, eighteenth and first half of the nineteenth century has followed the same general lines.
6. Present-day practice in the United Staates is not in accord with historical precedent. The change is contemporary with the great body of ineffective anti-trust litigation under the Sherman act.
7. What the public desires is a protection from possible extortion or abuse. Sherman act litigation, successful or otherwise, never could protect the public along these lines.
8. State legislation in regard to capital security issues has not achieved its purpose and is a source of hardship and inequality. Utilities are especially and injuriously affected.
9. Utilities are regulated, but the money market is not. Utility commissions have no power to compel investment. Utility security offerings must attract investors on their own merits or they will fail.
10. In rate decisions, though the commission may approve and specify a rate of return, the utility has no certainty of receiving it.
11. In regard to rate of return and regulation generally attention is often centered on the bond and note holder and not enough recognition given the stockholder —the true owner of the property.
12. Present regulatory methods might well give place to others offering progressively greater profit for progressively improved service to the public. There is every opportunity for the development of this special feature.

Service-at-Cost Accounting in Cleveland*

By H. J. Davies
Secretary-Treasurer Cleveland (Ohio) Railway

Practical Difficulties Encountered Are More Frequently Questions of Interpretation and Operation of the Ordinance Rather than Technical Accounting Problems — Specific Examples of Difficulties Encountered Under Cleveland Agreement Are Explained

H. J. DAVIES

ALL service-at-cost franchises provide for accounting in accordance with the standard classification of this association, or the classifications of state commissions or the Interstate Commerce Commission, based upon the standard classification of the American Electric Railway Accountants' Association. What better scheme of accounting could be asked? But the franchises are not perfect. Even then the principal trouble in Cleveland is not so much with the franchise itself as with the failure to carry it out or to understand it. 'Tis a contract more dishonored in the breach than in the observance. May I point out some of the respects in which it requires amendment, some in which it has been misinterpreted and which may be corrected without amendment, and others which are not understood?

We have been unable to convince the City Council of the necessity of adequate reserves for depreciation and renewal, for accident liabilities, for other deferred obligations, for the amortization of the cost of pavement owned by the city, for the amortization of all capital value in excess of the value of the physical property. Such reserves are desirable in the interest of both parties to the contract; of the stockholders, because, if the property is worth the capitalization, their investment is secure; of the car riders, because, first, if the capitalization does not exceed the value of the physical property, interest, and probably taxes, will be less per car-mile and per passenger than if the capitalization is excessive, and, secondly, the purchase price, if the city elects to buy, will be somewhere near the real value of the property.

One of the inadequate provisions of the Cleveland grant, as it has been interpreted, is that the physical property of the company, including a reserve for maintenance, depreciation and renewal, shall be kept in such a condition of repair that its value shall be 70 per cent (not 100 per cent) of its cost. As the physical property in existence at the time the contract was made was appraised and capitalized at 70 per cent of the cost of reproducing it new on Jan. 1, 1908, the provision for its maintenance in that 70 per cent condition was proper. It was provided, however, and properly, that all additional property should be capitalized at its actual cost. But it was also provided that this new property, as well as the original property, should be maintained at a value equal to 70 per cent of cost. There is no requirement for the amortization of the difference between cost and 70 per cent of cost.

Theoretically, the company is expected to limit its expenditures for expenses to certain amounts per car-mile, fixed in advance, as a budget. The original allowances were 5 cents per car-mile for maintenance expenses and 11½ cents per car-mile for operating expenses. In practice the allowances have not been sufficient to provide for the expenses. The reason for this has been, not that the company underestimated its expenses, but that the Council, in the hope of keeping the cost of service as low as possible, refused to "allow" enough to meet the actual necessary, legitimate expenses.

At the close of August there was a debit balance in the maintenance reserve account of $20,114 and a debit balance in the operating reserve account, accumulated since March 1, of $332,582, and there was a further deficit in the operating reserve of $60,000, for expenses incurred before March 1, a total of $412,696.

RESORTED TO "SPECIAL ALLOWANCES"

It has been the practice to provide for such deficits by what are called "special allowances." For illustration, on Feb. 29, 1920, the last day of the last ordinance year, there was a debit balance in the operating reserve account of $237,530.73. Of course, the balance in these reserve accounts should always be on the credit side. In order to start the new year without a deficit in the operating expense reserve account the $237,530.73 was charged to a "suspense account" and credited to the operating expense reserve account, wiping it out. This was reduced by a special allowance of $77,530.72 in March, leaving a balance in the suspense account of $160,000, which we are reducing at the rate of $20,000 per month by a "special allowance."

These suspense accounts are a method of transferring by bookkeeping entries the accumulated allowance deficits of past months or years to future months and years and assessing upon the car riders of the future a part of the cost of the service rendered the car riders of the past. The allowances should be sufficient to provide for the estimated expenses. A maintenance reserve is absolutely necessary for the protection of the investment of the stockholders. How can the company hope to sell stock at par on a 6 per cent interest basis, or even on a 7 per cent basis, when it has no such reserve, and no prospect of one? Yet such a reserve must come. And, in my judgment, no amendment of the franchise is necessary for it; it is already provided for, although not imperatively required, by the franchise. But the Council seems to have a right to refuse a reserve larger than the difference between depreciated value and 70 per cent of cost. The present value of the physical property, by the way, disregarding the high prices due to war conditions, which are, to a large extent, if not entirely, temporary, and disregarding also overhead charges, interest during construction and taxes during construction, is now less than 70 per cent of its cost. Other companies have reserves of millions of dollars and surpluses of other millions. The Cleveland railway is not permitted to accumulate a surplus. If a surplus should be earned it is to be absorbed in reducing the rate of fare.

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*Abstract of address presented at annual convention of the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 12, 1920.

A substantial accident reserve should be accumulated from current earnings and not wiped out at the end of the ordinance year. There should be money on hand to meet all unadjusted liabilities when they have been determined. Future customers of the company should not be expected to pay today's liabilities.

More than $2,000,000 of the Cleveland Railway's capitalization has been issued for pavement. The city's representatives claim that the pavement belongs to the city. If this is so, the value of the pavement should be amortized and the capital stock representing it should be retired. This would mean another saving in taxes and interest, thus benefiting both car riders and stockholders.

OLD FRANCHISE VALUES CAPITALIZED

Another respect in which the franchise is imperfect is in the carrying of $3,700,000 in capitalization as the so-called value of old franchises. The company does not own the franchises; they were surrendered when the Tayler grant was accepted. That capital represents the present worth on Jan. 1, 1908, of what the net earnings of the company would have been if the company had continued to operate under the surrendered franchises until their expiration. It does not represent any property owned by the company. Instead of providing for the gradual payment to the stockholders of those net earnings, the framers of the franchise ordered that capital stock for the amount of them be given to the stockholders and that interest be paid at the rate of 6 per cent per year upon that capital stock throughout the life of the new franchise and any renewal or extension of it. This treatment of the old franchise led to taxation troubles. The taxing officers took the position that as the capital stock and bonds of the company were worth par or more in the market, the company's property must be of a value equal to the market value of its securities. We argued that the company had no property represented by the capitalized net earnings; that the capital stock of the company was a liability rather than an asset of the company; that if the capital stock in question was property, it was the property of the holders of the certificates of stock, and not of the company, and that, if capital stock were taxable in Ohio, those certificates would be taxable as property of their holders, not as property of the company. The franchise should be amended so as to permit the amortization of that liability or the retirement and cancellation of the stock. This would mean a saving in interest of nearly a quarter of a million dollars per year to the car riders, and the value of the physical property would be nearer the capital value. The value of the remaining capital stock would be thereby enhanced. Thus the amendment would benefit both the car riders and the stockholders.

Another imperfection has recently developed—the difficulty of financing needed extensions and other betterments because of the inflexibility of the rate of interest—not more than 6 per cent on bonds, floating debt or capital stock. Negotiations begun more than a year ago for an increase to 7 per cent have so far failed. We find it impossible to sell 6 per cent stock at par, and so have been compelled to stop all improvements.

I am optimistic enough to believe, however, that all these defects and difficulties will be corrected.

The city has complained, in past years, of the provision in section 26 of the franchise for the capitalization of the difference between the cost of renewals of property and the reproduction value new of the superseded property, claiming that we should capitalize the difference between the cost of the renewals and the capital value of the retired property, that capital value being about 70 per cent of original cost or reproduction value. This provision, it was said, was in the interest of the company, and we admitted it, but said we were willing to have it changed if the city would also amend the franchise so as to provide for a reserve equal to the difference between capital value and depreciated value. To this the city has been unwilling to agree, although the amendment would be to the advantage of the car riders as well as of the stockholders. The cost of reproducing new the physical property that was in existence Jan. 1, 1908, has until now been greater than the capital value of that property. But if the provision of section 26 is to remain in effect and to be strictly complied with because the city fails to see clearly its own interest and still has the idea that what is bad for the company is good for the city, then it will work to the disadvantage of the company in the future, because prices are coming down and the cost of reproduction new five years from now, or ten years from now, of property acquired in the past five or six years will be less than the capital value of that property. Neither is arithmetically and exactly right. To retire at 100 per cent of the cost of reproduction, new, property that was capitalized at 70 per cent of its cost is of advantage to both parties, although the other party cannot see it. To retire at reproduction value in 1930 property that in 1920 cost 150 or 200 per cent of that value will be of disadvantage to both parties to the contract, because the remaining property will not be worth its cost, and so the investment will not be backed by assets worth the capitalization, and the cost of service will be more than it ought to be by the amount of interest and taxes on the overcapitalization.

VARIABLE DIVIDENDS ARE DANGEROUS

There is a provision in the Cincinnati franchise for variable dividends, but it is of doubtful advantage either to the car riders or to the stockholders. It is a provision that if the company's expenses in any period are less than its annual budget or estimate a larger dividend than 6 per cent may be paid to the stockholders. This provision is likely to tempt both the managers of the company and the representatives of the city to charge to capital accounts what should be charged to expense. This would result in overcapitalization. If the stockholders of today can increase their dividends, and if the car riders at the same time can reduce or keep down the rate of fare, by this method they will be tempted to do so. When the renewal of our franchise was discussed in the spring of 1919 the City Council offered us what was said to be a similar opportunity to increase the rate of interest on our stock to 6¼ per cent instead of 6 per cent per year. The offer was to amend section 19 of the original franchise by the insertion of a provision that at least thirty days before the first of May of each year the Council, in connection with the city Street Railroad Commissioner, prepare a budget of the probable expenses of the company for the ensuing year; that the company should not be permitted to expend more than the amount of the budget "except for extreme necessity, emergency or unavoidable and extraordinary contingency in the rendition of service demanded, and then not to the extent of more than 2 per cent of the gross allowances," and "if, at the end of any year, the Council shall find that the company has kept within its allowances, or shall not have exceeded the same by more than 2 per cent under the conditions above specified, then Council shall permit the company to take out of the interest fund an operating bonus of one-fourth of 1 per cent on the total average capital value for that year and distribute the same as interest to its stockholders," but that "if the company shall have spent more than the allowances, and if the Council shall find that the said overexpenditure was unnecessary for or not unavoidable in the rendition of service demanded, and not authorized by Council, then the company shall deduct from its interest allowance to stockholders the amount by which such overexpenditure exceeds the allowances."

We declined to accept the proposed amendment, saying, "It is, as was pointed out years ago by Mr. Johnson and Judge Tayler, inconsistent with the Tayler plan. It is an invitation to scrimp service—to the Council in order to keep the fare low, to the company in order to get the extra interest. In the interest of both parties to the contract, nothing should be written into that contract to threaten either the condition of the property or the quality of the service." The amendment tendered us an ostensible opportunity to pay 6¼ per cent a year to our stockholders, instead of 6 per cent. The opportunity was only apparent, not real, because the Council would not be likely to authorize an expense budget in excess of the cost of operation. Neither would a board of arbitration. Under the best possible management, expenses would probably exceed allowance, and this amendment provided that, if they did, the stockholders should not only not receive the additional quarter of 1 per cent but should suffer a loss in interest of the difference between 6 per cent and the amount of expenses in excess of allowances. It was said in oral arguments before the Council that the Cincinnati Traction Company's franchise contained a similar provision—a provision that, if the company's expenses were less than its annual budget, an increased dividend might be paid to the stockholders above the basic 6 per cent provided for in the grant, and that the greater the saving in expenses the higher the dividend might be. We answered that under the Cincinnati franchise the budget was to be prepared by the company, not by the city, and that we would be willing to accept as an amendment a provision similar to the Cincinnati provision. Then, as the chairman of the committee said at one of the meetings, there would be a great temptation to let the property deteriorate, and perhaps to pay for repairs out of new capital instead of out of earnings, thus impairing the security of the investment of the stockholders, increasing the amount on which interest would have to be paid, permitting service to become unsatisfactory, because of poor track and equipment, leading to increases in the rate of fare. In the interest of both parties to the contract, the road ought to be kept in good condition and the service ought to be adequate for public needs.

At the same time the Council also offered to amend the section which defines extensions, betterments and permanent inprovements, so that it would provide for the retirement of wornout or obsolete property at its capital value instead of at the cost of reproducing it new. We said we would accept the proposed amendment if the Council would amend section 21 correspondingly by substituting the words capital value for the phrase 70 per cent of reproduction value. Section 21 declared:

> The intent hereof with regard to the sum authorized by section 20 hereof to be set aside for maintenance, depreciation and renewal is to enable the company to maintain, renew, replace, preserve and keep its railway system and property, and every part thereof, and all extensions, betterments and permanent improvements hereafter made pursuant hereto, in good condition, thorough repair and working order, the standard of such condition, repair and working order being an average for the entire system of 70 per cent of its reproduction value; and the car-mile allowance provided by section 20 hereof for the purpose of maintenance and renewal shall not at any time be diminished unless the value of the property and the amount accumulated in the maintenance and renewal fund aggregate more than 70 per cent of the reproduction value of the said entire system.

And it has been held—erroneously, I think—that the allowance may not be increased unless the value of the property and the amount in the reserve are less than 70 per cent of the reproduction value of the entire system.

SHALL RETIREMENTS BE AT CAPITAL VALUE OR REPRODUCTION VALUE?

We were willing that this section should be amended so as to provide that obsolete or worn-out property should be written off the books at its capital value, instead of its reproduction value, but we wished that the amendment should also provide that no property should be retired at less than its capital value. We wanted a provision for a reserve equal to the difference between capital value and the actual or depreciated value of the property, so that the value of the property at any time, plus the amount in reserve, should be at least equal to the capitalization. In other words, we wanted to make the stockholders' investment more secure—secure beyond any doubt or question—by a provision that would make the physical assets of the company worth as much as or more than the amount of capitalization. Such a provision would not harm the city in any way, because the price at which the city may buy the property is fixed in the franchise and the city's bargain in case of purchase will be better if the value of the physical property is equal to or exceeds the option price than if it is below that price. The provision that the maintenance, renewal and depreciation reserve need not be greater than the difference between the depreciated value of the property and 70 per cent of its reproduction value, we argued, was inconsistent with the declaration of the preamble of the franchise, and with the provision of section 47 that the ordinance was to be a contract between the city and the company which would secure to the company unimpaired the capital value described in section 16, and inconsistent with section 16 itself.

Our contract with the city implies a trust. Both parties to it are trustees, the city for the car riders, the company for the stockholders. The city is, in a sense, also a trustee for the stockholders—to the extent, at least, that the property be maintained at a value equal to its cost, so that the capital stock may be always worth par. If it does not owe this duty to the stockholders, it should do this as trustee for the public, so that the company may be able to finance its extensions and other betterments and to finance them at the low rate of interest permitted by the franchise. If the company cannot obtain money by the sale of its capital stock, the public will lose the benefits that would result from the growth of the system as the city grows in population—not at equal pace with the growth of the city, perhaps, but at a substantial percentage of that growth.

The directors and officers of the company have regarded their duty under the franchise as something more than to pay 6 per cent interest to the stockholders. They have regarded themselves as trustees for the car riders, with an obligation to furnish street railway service at cost, and to make the cost as low as possible consistently with proper maintenance of the property and other legitimate expenses of operation, such proper maintenance being of advantage to the car riders as well as to the stockholders. There has been no attempt on the part of the company to make expenses unnecessarily high, or to urge the construction of extensions not needed in order that stockholders might have the benefit of purchasing additional stock at par, with the hope of selling it to the city at a bonus of 10 per cent. During most of the ten years under the operation of the service-at-cost plan, the stock of the company has sold on the Cleveland exchange at premiums ranging from a fraction of 1 per cent above par to $114 per share.

The management has a responsibility not to let the property deteriorate as a whole—a responsibility to accumulate a fund as the property wears out or approaches obsolescence from which to renew or replace it, that fund being equal to the difference between cost or capital value of the property and its depreciated value, the depreciation being based on the departed years and months of its probable life. In the interest of all concerned, this should be done. Not to have a fund ample for this purpose leads to overcapitalization, to renewal or replacement of obsolete or worn-out property from new capital, increasing interest and injuring credit because of failure to protect the investment by a property worth par of the investment, and so leading to a possible increase, not only in the amount of interest but in the rate of return.

CAPITALIZATION SHOULD BE FAIR

The city, too, should be diligent to see that the company is not overcapitalized, and that the property, by means of an adequate reserve, is kept in as valuable a condition as when it was new. The city has a right to a good property, in order that it may have good service, and that the company may be able, by reason of the value of its assets, to sell capital stock with ease at par. It should see that there is no deterioration in the property; that the property, including the reserve, is fully equal in value to the capitalization, or, putting it the other way, that the capitalization is never in excess of present value.

It has been suggested that the principal efforts of the directors and officers of the company should be to put out as much capital stock as possible by urging the acquisition of additional property in order that the stockholders may profit by a sale to the city, which has an option to buy at par for the company's bonds and floating debt and $110 per share for its capital stock. Of course, the city ought not to consent to any such program. It should insist that the property be maintained at a value fully equal to the par of the outstanding capital by means of an ample reserve. That reserve may be in cash, may be invested in approved securities or in additional physical property, or may be used to retire bonds, floating debt or capital stock. But the suggestion is a short-sighted one, even from the stockholders' point of view. They should protest against any increase in the difference between capital value and asset value, especially as the prospect of purchase by the municipality recedes. The likelihood of the city exercising its option to buy is less now than it was ten years ago. Municipal ownership and operation are not so popular as they were then; at least, among those who advocated them at that time. That consummation is more devoutly and earnestly wished by the owners than by politicians or public.

It may seem strange that this preachment should come from an officer of the company rather than from a representative of the city. But I assure you I speak for the stockholders.

Why cannot the city see that service cannot be improved, nor fares reduced, except temporarily, by permitting the property to deteriorate without filling, by a reserve built up from earnings, the void created by mechanical depreciation, wear and tear, obsolescence, accidents and the postponement of payment of debts, between the real value of existing property and its capital value or cost? I suppose because they are as short-sighted as the old bachelor pedagogue who, when urged to do something for posterity, asked, "What has posterity ever done for me?" Let the car rider of today pay the entire cost of the service he gets, and not shift any part of it to his children or grandchildren, or any other car riders of the future.

Ten years ago, at the close of the first six months of operation under the Tayler franchise, I prepared a paper for you on some of the accounting features of the franchise and included in it tables showing the earnings and cost of operation in those six months and in the corresponding six months of four previous years. I append to today's paper tables showing the earnings and costs in each year from 1911 to and including 1919, that you may see the variations in fare and expenses. The year 1906 was the last in which the company operated for private profit at the rate of fare fixed in its franchise, *viz.*, 5 cents cash, eleven tickets for 50 cents, free transfers. In 1907 it made experiments with six-for-a-quarter and seven-for-a-quarter tickets, and the Forest City Railway operated two lines throughout the year at a fare of 3 cents. On April 27, 1908, our property was leased to the Municipal Traction Company, which operated it at 3-cent fare until it went into the hands of a receiver in October. During a part of that year no transfers were issued; a person who desired to transfer paid a second 3-cent fare; some paid a third. From Oct. 22, 1908, to Feb. 28, 1910, the road was operated by receivers, at two or three rates of fare. On March 1, 1910, the property passed out of the receivership into the hands of the Cleveland Railway, and ever since has been operated under the Tayler franchise. The tables show the average fare in each year. They show, also, the earnings and the cost of operation, including taxes and interest, per car-mile, and in these respects should be more interesting to you than they are to us of the Cleveland Railway, because each of you can compare them with your own operations and we cannot, except as we have been favored with copies of your annual reports.

Our operating revenue in 1919 was 42.791 cents, our non-operating income 0.5583 cent, a total of 43.3493 cents. Our allowances for expenses, including "special" allowances, were 32.4781 cents, our taxes amounted to 3.4728 cents, and our interest charges, including interest on capital stock, to 5.5450 cents. Our revenue per mile of track operated was $39,200; maintenance expenses were $9,300, operating expenses $20,100, taxes $3,200, and interest, including interest on capital stock, $5,088. Maintenance expenses were 23 per cent, operating

TABLE I—ALLOWANCES FOR MAINTENANCE AND ACTUAL PAYMENTS

	Allowances		Actual	
Year	Amount	Per Car-Mile, Cents	Amount	Per Car-Mile, Cents
1911	$1,390,079	4.95	$1,506,651	5.36
1912	1,438,662	4.94	1,387,427	4.77
1913	1,499,339	4.95	1,775,372	5.86
1914	1,662,397	5.14	2,048,437	6.34
1915	1,676,708	5.17	1,916,712	5.91
1916	2,492,512	7.36	2,303,693	6.79
1917	2,587,519	7.22	2,592,698	7.23
1918	3,137,337	8.94	3,106,717	8.86
1919	3,968,059	10.98	3,667,513	10.15

TABLE II—ALLOWANCES, TOTAL AND PER CAR-MILE

	Allowances	
Year	Amount	Per Car-Mile, Cents
1911	$3,423,634.40	12.19
1912	3,347,558.13	11.50
1913	3,688,360.13	12.17
1914	4,030,933.82	11.95
1915	4,247,065.22	12.44
1916	4,609,768.52	13.61
1917	5,416,432.89	15.12
1918	6,793,036.63	19.36
1919	7,765,416.00	21.49

expenses 50 per cent, taxes 8 per cent and interest 12.79 per cent, of revenue. We furnished ten and one-half rides (fares, transfers and deadheads) per car-mile.

Trailer car-miles are calculated at 60 per cent of the actual number of car-miles run by trail-cars. Of the 38,000,000 miles run in the year 2,000,000 were run by trailers.

Today our allowances are 11 cents for maintenance and 29 cents for operation, plus "special" allowances of about 2 cents per car-mile, a total of 42 cents. Compare these allowances with your expenses.

TABLE III—INCOME BY YEARS

	Passenger Revenue, Cents per Car-Mile	Operating Revenue	Total Income
1910	22.91	23.57	23.72
1911	22.01	22.67	22.87
1912	22.11	22.84	22.95
1913	22.89	23.55	23.68
1914	23.24	23.80	23.93
1915	25.56	26.12	26.34
1916	27.52	28.11	28.33
1917	27.85	28.41	28.63
1918	34.55	35.17	35.47
1919	42.14	42.79	43.35
	Cents per Fare		
1910	3.48	3.58	3.60
1911	3.25	3.35	3.38
1912	3.15	3.26	3.27
1913	3.14	3.23	3.25
1914	3.25	3.33	3.35
1915	3.44	3.51	3.54
1916	3.42	3.49	3.52
1917	3.42	3.49	3.52
1918	4.42	4.50	4.54
1919	5.21	5.29	5.36

TABLE IV—MAINTENANCE AND OPERATING EXPENSES

	Maintenance, Cents per Car-Mile	Operating	Total
1911	5.36	12.07	17.43
1912	4.77	12.19	16.96
1913	5.86	12.23	18.09
1914	5.97	12.22	18.19
1915	5.27	12.55	17.83
1916	5.66	14.00	19.66
1917	5.77	15.34	21.11
1918	6.74	18.21	24.95
1919	8.44	21.96	30.40

Table I shows the regular and "special" allowances for maintenance, and the actual expenditures for maintenance, in the past ten years, and the amounts per car-mile.

Table II shows the regular and "special" allowances for operating expenses and the amounts per car-mile in the past ten years.

The Accounting Profession*

By George L. Vannais

Certified Public Accountant, Hartford, Conn.

Opportunities Are Unlimited, but High Class Training
Is Necessary to Make the Most of These Opportunities.
Accountants Make Possible Present Business Systems

TO TREAT this subject comprehensively we must consider some definitions: First, What is accountancy? I am pleased to call it the "Science of Business Control." Let us contemplate this definition for a moment. A generation ago there were many business successes controlled by the genius of a single man or group of men. Such an organization usually had a pioneer field, and by virtue of its patents or its superior service maintained its commercial supremacy. But as time went on new inventions were made, old patents became obsolete, competition set in and the necessity arose for more accurate records which would show the cost of production and the expense of distribution. The rule of thumb gave way to the significant per cent sign. Successful business control became possible only through the use of comparison sheets.

Many trade associations were formed, and where once petty jealousies existed between men in the same lines of endeavor there came about mutual friendships and the interchange of confidences and comparisons that were to benefit not only the producer but the consumer. These comparisons could only be made when the records were uniform; standards had to be set.

You men before me and all the interests you represent are to be congratulated on the foresight of the men in the street railway business who, from the beginning, saw the necessity for uniform accounting and appreciated the benefits of standardization. If your industry, which has been so potent in the development of the industrial, educational and social life of America, fell on evil times, you have the satisfaction of knowing that the general managers of the street railway systems did not go ahead blindly.

The keeping of records is an art; the creation of them a science. Ten thousand men are busy with the art in your one line alone. A few hundred of you men are developing and perfecting the science.

This leads us to another query: What is an accountant? And I venture this definition: An accountant is one who, by natural aptitude, extensive study and wide experience, is able to analyze accounts, correlate them, reconstruct them if necessary, and then, from the written record, visualize, for himself and others, a true picture of the condition of a business.

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*Abstract of paper presented at annual convention of the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13, 1920.

Accountants may be divided into two great classes—the public accountant and the private accountant. The public accountant occupies an important place in business life. To show you the ideals of the profession, let me quote from an address by one of the leading men of the public accounting profession, Edward L. Suffern:

> The public accountant must be trained, not alone in the technical school but through outside observation, practice and knowledge of the affairs of the world. He must learn to observe. In order that he may know how to observe and to observe wisely, he must learn something of the economic conditions and principles which govern the making, handling and distributing of all products. He must know something about commercial law; he must know a great deal about the science of business administration; in fact, he must have a more broad and general training than is at present required in any other profession. But he must have learned something else, without which his other acquisitions are as nothing at all. He must have learned to be honest, truthful and conscientious, so that in no circumstances and for no consideration will he ever do one thing which his best developed, highest conscience cannot approve.

These are the qualifications of an educated man; these are the qualifications of a man of highest ideals; these are the qualifications of the men in the public accounting field who have won for the profession the respect and the confidence of the financial world.

The other class, the private accountant, in my opinion holds an equally important place in the economics of our times. He must have a wide knowledge of his own particular line of business. He must be well versed enough in general business to know the effect on his own particular business of all other industries. But he need not have a technical knowledge of their activities. Usually a private accountant has not made a deep study of the science of accounts. In the majority of cases he was graduated from the college of experience. His first textbook was the office broom and he learned the elements of his profession by doing the detail work. His ambition urged him on to every succeeding step in his upward progress until the day came when he was made chief accountant, and looked back over the long road he had so faithfully followed. Every man in this association who has reached this goal I have just described has found it necessary to develop himself to the highest degree of efficiency as he climbed onward and upward.

But our subject is "The Accounting Profession," and that word "profession" indicates an organization, a collective body, or, as Webster defines it: A collective body of persons engaged in a calling," and I presume, strictly speaking, private accountants would not be included in the profession of accountancy. It is sometimes thought that only those public accountants who are certified are in the profession, but this is not so, for there are many good professional accountants who have never been certified by any state. And again membership in the American Institute of Accountants has been held to be necessary for a man to be in the profession, but this cannot be, for there are also many men who are good professional accountants who are not members of the American Institute. Some of them are certified public accountants and still, for one reason or another, they are not members of the American Institute. However, I think it safe to say that the visible line which decides whether a man is in or out of the profession is found by applying the query as to whether or not the man is in public practice.

Assuming, then, for the sake of argument, that the profession is circumscribed by those in public practice, let us consider for a moment the status of the profession. Nearly every state in the Union has passed what is known as the C.P.A. law. It purports to regulate the practice of accountancy by issuing to all those who can qualify by test a certificate from state officials certifying that these men are of good moral character and are competent to serve the business of the commonwealth as public accountants.

The first C.P.A. law was passed in New York State on April 18, 1896. In 1905 the American Association of Public Accountants was formed. The membership was made up principally of the several state societies of certified public accountants. As each state had a different C.P.A. law, the membership requirements were not uniform, thus reciprocal relations were often denied. To establish the profession on a higher plane, on Sept. 19, 1916, the entire plan of national organization was changed. The name was changed to the American Institute of Accountants; state representation was abolished and individual membership substituted.

The American Institute of Accountants has today a membership of about 1,400. It meets annually in convention, four out of five years in the city of Washington. All members of the old American Association automatically became members of the new Institute when the Institute was established. Now, all admissions to the American Institute are by examinations.

It is estimated that there are at the present time about 3,000 certified public accountants in the United States. Less than half of them, however, are in public practice, and this leads to a peculiar situation in the profession of accountancy. When a man studies law, in nearly all cases he is a lawyer all the days of his life. If he studies medicine, he seldom forsakes the profession, but if he qualifies for the profession of accountancy, and goes out into public practice, he is continually tempted to leave the public field. Everywhere he does a fine piece of work the client looks on him with envious eyes and time and again he is offered such a flattering salary that he turns his certificate to the wall and becomes an executive. Within the last ten years I personally have known many men high up in the profession who have done this very thing. A few of them are today at the heads of great industrial organizations.

This is the reason why the accountancy profession can never be overcrowded. It used to be said that a public accountant was a bookkeeper out of a job. Today I think it is universally acknowledged that the public accountant is the bookkeeper who has grown out of his job, and as proof that this is so I wish to call your attention to the fact that bookkeepers often become public accountants, but men who have been public accountants long enough to have made any kind of start never become bookkeepers again. They may become office managers and executives, but they never go back to the old ledgers.

The accountant, whether private or public, who measures up to the ideals I have outlined occupies an important place in the world's work. He is the right hand of progress; he is the counselor of the captains of industry; his financial reward is such that he can educate his children and surround his home with the comforts and many of the luxuries of life, and before him always is the opportunity for better and greater work.

Transporting Other than Passengers on Interurban Lines*

By Britton I. Budd
President Chicago, Milwaukee & North Shore Railway

An Opportunity Is Presented to a Great Many Roads at Present to Develop a Merchandise Business—Higher Rates than Those Charged by the Steam Roads Are Warranted and Will Be Paid

IF THE electric railroad can increase its usefulness to the communities it serves by the transporting of merchandise as well as passengers it will be more apt to gain and hold that good will which is so essential to success. Moreover, no road can afford to overlook any business which may increase its revenues.

The steam railroads have been so handicapped for lack of equipment that they have not been able adequately to meet the demands upon them. From every city there has arisen a cry for additional transportation facilities. One result of this demand has been the development of the motor truck as a competitor of the electric railroad for the transportation of merchandise. Although the motor truck is neither as economical nor as reliable as the electric railroad and is unpopular with the taxpayer because of the damage which heavy trucks do to public highways, still it is a serious competitor in some sections of the country. In our Northern climate the competition of the motor truck is less to be feared on account of the difficulty and expense of operating on the snowbound highways, while the interurban railroad is dependable every day in the year. Nevertheless, it is a factor which cannot be ignored.

If we admit that there is a field for such business and that the time to exploit that field is opportune the question turns upon two chief points:

1. Is the transportation of merchandise by the electric railroad on a large scale practical from an operating point of view?
2. Can the business be made profitable?

To both questions I would answer affirmatively in a general way, although conditions are not alike on all interurban railways and what might be practicable on one road might be impracticable on another.

The principal function of the interurban railroad is to furnish quick and convenient transportation for passengers. That must remain its chief function, and should a local condition obtain where the handling of merchandise will interfere seriously with the more important business of carrying passengers it would be better for the road so situated not to attempt it. But where terminal and track facilities are such that an interurban road can engage in merchandise traffic without impairing its passenger service I think it both expedient and advisable that it should do so.

To make comparison of conditions easier, I have separated into three classes interurban railroads which are engaged in handling merchandise:

1. The comparatively small road with few passenger cars and limited facilities on which merchandise and passengers must be carried on the same train.
2. The interurban road whose passenger business is of such a character that it must establish a separate operation for merchandise.
3. The electric railroad having connection with steam roads which handles standard freight cars.

BRITTON I. BUDD

ROAD WITH COMBINED PASSENGER AND EXPRESS CARS

The first road named in the classification, in spite of its limited facilities, may develop a profitable business and add greatly to its usefulness to the communities it serves by carrying merchandise in an express compartment in its passenger cars. Such a business does not require additional investment in power and needs little in the way of equipment, as the bulkheads can be set at a point in the car which will give a proper balance between the number of passengers and the amount of merchandise to be carried.

The service which a road of this class is capable of giving is frequent and expeditious, and customers will gladly pay rates for it higher than those prevailing on steam roads. Of course, such a service involves an investment in terminal and local station facilities, but as these would be maintained in connection with passenger stations the business which might be developed would easily justify the comparatively small investment.

The point to be guarded against in developing a business of this kind is whether it might hurt the passenger business. The handling of merchandise would necessarily involve longer station stops, due to loading and unloading. Should this result in undue irritation of passengers it might prove unprofitable from every point of view. That is the reason that I say the subject should be carefully studied from every angle.

OPERATION WITH SPECIAL PASSENGER AND MERCHANDISE CARS

On the second type of interurban in the foregoing classification a considerable investment in car equipment, sidetracks and freight houses is necessary to successful operation. Usually this type of road operates through cities and towns on public streets where the use of standard freight equipment is impracticable, even if it is not prohibited by local ordinances. Freight cars arouse the hostility of the people when operated on streets, so that special express cars are essential if a successful business is to be built up.

In addition to the capital investment in equipment, stations and sidetracks, a complete and capable organization must be developed properly to handle the merchandise business. This organization should be made up of men experienced in the handling and transportation of freight, as it is easily possible through inefficiency and inexperience to allow operating expenses to run so high as to make what should be a profitable business a financial failure. In other words, if an interurban railroad undertakes to handle merchandise as a separate branch of its business it should go into it in earnest and not look on it as a side issue. The road must go after the business, not wait for it to come.

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*Abstract of paper presented at annual meeting of American Electric Railway Association, Atlantic City, N. J., Oct. 13, 1920.

To build up a profitable merchandise business is not such an easy matter as it may seem. To begin with, there is a natural prejudice against the electric road. That prejudice must be "sold" on the advantages offered by the interurban, and the transportation department must see to it that all claims of superiority made by traffic solicitors actually are made good by the quality of the service. If the traffic agent assures the shipper that his goods will be delivered within a specified number of hours after being received, such promises should be fulfilled to the letter. The road must make good on everything it claims it can do through its advertising and direct solicitation of business.

A most important part of the organization of which I speak is the claim department. The prompt settlement of claims will go a long way toward obtaining the good will of the shipper. On the other hand, dilatory tactics in the adjustment of claims will drive away desirable business.

The volume of traffic on the electric road is so small in comparison with that on the steam road that the superior quality of its service should be reflected not only in the quicker transportation of goods but in every detail connected with the business. The consignee should be promptly notified on the arrival of shipments. Facilities should be provided at terminals for the prompt loading and unloading of delivery trucks. That is one of the best talking points in soliciting business. To have trucks held up for hours at a terminal is an expensive arrangement for the shipper. Congestion at steam railroad terminals usually is great, and it is possible for the interurban road to relieve the shipper of this expense and gain his good will and business, even at a considerably higher rate than charged by the steam roads. The average shipper wants to get service. This service should begin when the truck carrying the merchandise appears at the receiving station and should follow that shipment until it is turned over for delivery to the consignee. It makes quite a difference in the mind of the shipper if he feels assured that his shipment will be given a personal attention which it cannot get on the steam roads where the volume of business is too great to permit of that.

HIGHER RATE IS WARRANTED

The expeditious handling of shipments means a great deal to the shipper and justifies a higher rate for the service. The interurban road as a rule can make delivery overnight, so that orders can be filled from one city instead of carrying a stock in a storehouse in another city 50 or 100 miles distant. This means less capital tied up in transit. I know of an instance where an interurban road receives a carload every night for the reason that double the quantity of goods would be tied up in transit on the steam road because of the longer time required to deliver them.

Another important part of the organization is the accounting department. The cost of handling different classes of merchandise should be analyzed in detail, for the interurban road seeking to build up a merchandise branch may adopt a policy of accepting any kind of business offered and learn later that it has made a grave mistake. There are some classes of business which an interurban railroad cannot handle with profit. It should, therefore, discriminate carefully in its selection of the business it accepts, taking only that where quick handling and superior service warrant a rate that will show a profit. In order to be able to use such discrimination the accounting methods must be up to date. The traffic department must know what it costs to handle every description of merchandise, so that it can be governed accordingly in soliciting business. Shippers are ready and willing to pay a higher rate for such service because it is worth it from a business standpoint. But to give that kind of service the road must have adequate facilities and it must give the strictest attention to every detail. It is a mistake to suppose that a service like that necessarily means such high operating expenses as to make the business unprofitable. It does, of course, mean higher operating expenses than on steam roads, but efficient methods in every department will produce the service without swallowing up the profits in operating charges.

INTERCHANGE OPERATION WITH STANDARD STEAM EQUIPMENT

On the third road in my classification, that which has direct connection with a steam road and handles standard freight equipment, the same methods outlined for the second road largely apply. Real service appeals to the farmer just as strongly as it does to the merchant or manufacturer. That has been fully demonstrated within my own observation.

The farmer has great difficulty in getting cars and service, both in the way of delivery of farm supplies and for the shipment of farm products. If an interurban which has connection with a steam road runs close to his farm it is an easy matter to get him interested in its possibilities. Indeed, it is easy to interest a group of farmers into paying the cost of a siding which will be of service to them. I know of instances where farmers drove past a steam railroad to load their product onto standard freight cars on an interurban and pay a considerable additional price, for no other reason than that the electric line could offer them a faster service and was able to give them cars when they wanted them.

"MERCHANDISE" VERSUS "FREIGHT"

It will be observed that throughout this paper I have generally used the word "merchandise" instead of "freight." The service given by the electric railroad is nothing like the freight service of the steam road. The rates on the electric road are higher than freight rates, because the quality of the service commands a higher charge. Most electric roads cannot give a freight service.

Since neither the service nor the rate is comparable with freight service on the steam road, why confuse the shipper in the use of terms? If you call your service on an interurban road a freight service, how can you convince the shipper that it is different from that given by the steam roads? How can you justify in his mind the higher rate you must charge for your service? The business is more in the nature of an express except that it usually is faster and that it has no pick-up and delivery service. Personally, I am not in favor of a pick-up and delivery service in connection with the transporting of merchandise on an electric railroad. I think it is difficult to conduct it profitably. The railroad should confine its functions to handling merchandise delivered to its stations.

In conclusion I would say there is no question in my mind that the electric railroad should come forward and assist in solving the transportation needs of the country. If it is provided with the proper facilities and furnished a suitable organization I am satisfied that a profitable business can be developed, a business which the electric railroads need and which the shipper will appreciate.

Problems and Principles of Public Safety*

By C. M. Talbert

Director of Streets and Sewers, St. Louis, Mo., and Chairman
Public Utility Section National Safety Council

Experience at St. Louis and Elsewhere Shows that Accidents in Public Streets Can Be Controlled by Organized and Persistent Effort of Public, Insurance Interests and Industries

C. M. TALBERT

APPROXIMATELY one-fourth of our population is subject to industrial hazards. Under conditions subject to quite considerable control, both of men and surroundings, practically every man, woman and child is subject to some form of public hazard on leaving the home. A classification of fatalities by a large insurance company covering a period of five years showed 51 per cent public, 14.5 per cent home and 34.5 per cent industrial. Of the non-fatal "claims" 45.1 per cent were public, 17.2 per cent home and 37.7 per cent industrial. This company in 1919 paid $450,742 for personal injuries arising from automobile accidents.

In 1907 the automobile fatalities numbered nine per million population and in 1919, 100, and the number estimated for 1920 is 110. Thus in the United States one death occurs every thirty-one minutes of the sixteen hours commonly assumed to be working hours. Fatalities are not increasing with machines in use, there being a drop from 2,756 in 1912 to 1,282 in 1919 for each million automobiles. Steam railroad fatalities decreased from 178.4 per million of population in 1907 to 105.2 in 1918; street railway fatalities from 43.7 to 28.9, and fatalities from all other vehicles from 36.3 to 27.3.

The total for all vehicular accidents increased from 245 per million in 1906 to 253.3 in 1918, although deaths from all other forms of accidents decreased from 685.3 per million in 1906 to 563.9 in 1918, a reduction of 18 per cent.

These figures are from tables prepared by F. H. Crum and may be taken as accurate. Mr. Crum states in his report:

> In those cities in which the National Safety Council, through co-operation with local safety councils, has been conducting campaigns of public safety during 1919 the percentage of increase in the automobile fatalities is shown to have been far below the average for the thirty-six cities combined, with the single exception of Pittsburgh. In St. Louis, Chicago, Rochester and Detroit intensive campaigns against all accidents, and particularly industrial and public accidents, have unquestionably already resulted in the saving of many lives.

Statistics show that but 10 per cent of the claims originate within the shops or property of the companies and that 90 per cent originate with the general public. It is safe to assume that the electric railway, in common with other business interests, is guarding the 10 per cent of industrial accidents. Its real problem is, therefore, the public hazard of 90 per cent.

Most progressive street railway companies have exerted efforts to remedy conditions and have spent considerable money and worked out campaigns for accident prevention so far as their particular interests are concerned. I do not believe the companies would claim that any great benefits had accrued to them, and we know that at least no such success has been attained as to create a following among electric railways generally. The fact is that public accident prevention cannot be made effective by individual corporations or public utilities. The situation, however, is without hope, but the methods employed are not the proper ones.

PUBLIC SAFETY IS A FERTILE FIELD FOR ENDEAVOR

Within the past ten years or less industrial safety has been thoroughly systematized and established as a business proposition. Public safety, while much more difficult to approach and while probably less tangible in results, is yet just as susceptible of control and has just as definite principles and foundations as industrial safety. The one great cardinal principle to which all others must be made subordinate is education. Force, control or direction, whether by ordinance, the courts, by police force, by signs or by other means, will not be greatly effective nor produce the desired results until the general public is educated to recognize the public hazard, its possible effect upon each individual and the means by which it can be controlled.

It is not possible to detach or isolate any particular public hazard and make any very successful attempt to better it, whether the attempt be made by steam railroads as to highway crossings, electric railways as to public highways, insurance companies as to automobile collisions or any other of the quite numerous items of public hazard. These interests should see that a particular hazard can be reached better, if not only, through the general effort to secure the vital and powerful aid of public sentiment. Only through a pooling of the common purpose of those who from humanitarian, official or financial interests are interested in public safety can any great and permanent good be achieved.

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*Address delivered before joint meeting of American Electric Railway Transportation & Traffic and Claims Associations, Atlantic City, N. J., Oct. 11, 1920.

The meaning of the accident problem to electric railways as a matter of finance is shown by Table I, which contains statistics compiled from the records of sixteen of the largest cities of the United States, widely scattered.

TABLE I—FINANCIAL ASPECTS OF ACCIDENTS

	1914	1918
Accidents per million passengers	51	48
Accident reports	213,796	208,400
Claims disposed of	62,320	72,304
Percentage of claims to accidents	22	33
Total expenditures for claims	$7,211,968	$9,450,592
Cost per accident	$35	$45
Total cost per claim settled	$139.37	$148.37
Percentage of claim cost to gross revenue	4.5	4.9
Suits pending	13,411	20,203

The total expenditure for claims of the largest seven systems, reported for the year 1918, was $6,300,000, or 4½ per cent of the total gross revenue. The claim agent of the United Railways of St. Louis states his conclusion that 90 per cent of all the claims paid by his company result from accidents in which the public is concerned. The claims costs in two instances, namely, Buffalo and New York, approximate 10 per cent of gross revenue.

ANNUAL CONGRESS SAFETY WEEK NOTABLE SUCCESS

That accident prevention does react to an aroused public sentiment was first shown conclusively during the 1918 annual convention of the National Safety Council at St. Louis. A somewhat elaborate safety campaign was planned by the local branch, the details of which included a window card for each school child receipted for by the parents, store window decorations and placards, safety slogans printed on fans and held in the hands of traffic officers while discharging their duties, slogans placed on safety zone standards, signs carried on fronts of service cars and placed on trolley poles, placards on automobile windshields, demonstration in one of the principal streets by the fire department, use of Boy Scouts to check "jay walking," etc. The records of the coronor's office for this week showed one fatal accident, as against twenty-four for the same week of the previous year and an average of ten per week for the year before.

During the 1919 convention week at Cleveland somewhat similar methods were employed. The fatalities here numbered five, as compared with fourteen in the previous year. The 1920 convention was held in Milwaukee, closing on Oct. 2. During this safety week there were no fatalities, as compared with seven during the same period in 1919.

The record at St. Louis might have been an accident and the one at Cleveland a coincidence, but that at Milwaukee must surely establish the safety week accident reduction as a habit. In these compaigns the electric railways were very active and were valuable co-ordinating influences. The business interests identified with the automobile industry also were active and efficient workers for public safety, and because of their position they were peculiarly effective in reaching drivers of cars.

As a result of the developments following the first St. Louis experience these conclusions have been reached:

1. An aroused public sentiment is the most forceful influence that can be brought to bear upon accident prevention, and from the nature and psychology of the public no corporation or business interest can do such arousing.

2. Men and women of every walk of life will give freely of time, money and influence if they can be made to feel that what they are giving will be made effective and will form part of a well-developed and consistent plan bearing promise of definite results.

3. Any plan devised must be continuous in its operation and a trained and salaried officer must be placed in charge.

4. The law-making and law-enforcing officials of every community will gladly welcome and co-operate with a public safety committee, when once convinced that it is to be helpful and not merely critical.

5. As public safety is a matter of education, the most fruitful grounds for ultimate results are the public and parochial schools, and principles of safety can just as well be made a part of the curriculum as the principles of grammar, arithmetic or any other of the usual studies.

6. Industries can be made to see that the loss to them of a trained man's time through injury is just as great whether it occurs inside or outside the walls of their plants.

The practical question which must naturally arise in mind is: "What are the details of the plans by which these results are to be accomplished?"

A DEFINITE PROGRAM FOR PUBLIC SAFETY PROMOTION

Omitting the steps by which the present accepted plan is arrived at, except to say that the first plan was too meager and the second too elaborate, I could summarize the procedure as follows:

1. Form a public safety committee, affiliated with and a part of the chamber of commerce or other comparable body of the city, selecting as sponsors and guarantors for this committee the busiest and most influential men of the city. This has been done during the past two years in sixteen cities, including St. Louis, Cleveland, Rochester, Kansas City, Pittsburgh, Grand Rapids, Milwaukee and Cincinnati.

2. Collect a fund to guarantee expenses until such time as a permanent scheme of financing can be put into operation.

3. Form committees as follows and whose duties will be as indicated by the titles: (a) A police committee, with the chief of police as chairman, (b) a school committee, with the superintendent of schools as chairman, (c) a publicity and bulletin committee, (d) a women's club committee, (e) a Boy Scout committee, (f) a church committee, (g) a motion-picture committee, (h) an automobile legislation and traffic committee and (i) a law-enforcement committee.

The number and character of the members of these should, of course, be given the most careful consideration, with due consideration of the amount of active work that can reasonably be expected from each man as well as the influence to be wielded by him as a leader in the community. It is in the membership and work of these committees that the very great contribution (aside from financial) can be made by the electric railways. Some of the most valuable men in most of the cities have been the claim agents of the electric railway companies. They, by reason of their long study of conditions, are peculiarly fitted at once to enter into active work. The importance of this fact, and the advantages of the cars and trolley poles as an advertising possibility can hardly be overestimated. The claim agent in St. Louis is, as I can testify, ranked as one of the most valuable of the leaders.

ST. LOUIS HAS IN OPERATION A SUCCESSFUL PLAN FOR SAFETY EDUCATION

In the public schools of St. Louis there has been worked out by a St. Louis man within the last two years a system of safety education which has been formulated in a textbook. This has been indorsed by the National Educational Association and the National Safety Council and is coming into considerable use. It is based upon the use of the subject of safety to illustrate, for instance, problems in arithmetic, studies in English, etc., and is co-ordinated with the formation of safety committees of the school children. Among the duties of these committees are the following: To assist the traffic officer in the vicinity of the school and take his place if absent; to watch the younger children at stairs; to watch danger points in corridors; to place, care for and remove "Slow—Drive with Care" signs in the streets at schools, and to do a number of other things of this kind. The plan can be seen in active operation on any school day in schools in St. Louis and a number of other cities. Dr. Payne, the author of the textbook mentioned, has condensed his observations on school children and street cars as follows:

> I. This is a big problem because children are not directly under the supervision of parents or teachers when they are on the streets. Moreover, the streets in the school district cannot be policed in such a way that would protect children from the innumerable street dangers and especially danger from street cars.
>
> II. Children have a special fondness for stealing rides on street cars and seek every opportunity to take unusual chances in connection with them.
>
> III. Since these hazards are always present, and it is impossible to exercise direct control by parents, teachers or policemen, controls must be developed within the children themselves that will lead to the elimination of the hazards.
>
> IV. Therefore, the problem of education in safety against the dangers of the street railways is simply the development of controls in the children that will secure the proper results.
>
> (a) These controls are fundamentally a matter of habit, and the habit of care with reference to street cars is merely a part of a group of habits that affect the control of the children on the streets generally. That is, the places and methods of crossing and remaining away from the street cars in motion. The method of developing these habits is to utilize older school children to station at street crossings to direct the children traffic. The direction of the children across the street will not in itself insure correct habits, but it is necessary to develop in the school itself public opinion on the question of care with reference to street cars and other street dangers. This is done by the study of newspapers, newspaper reports of accidents and numerous other sources of accident satistics in the regular class work.
>
> (b) Not only must habits be developed but there must be intelligence or knowledge of accidents that will take care of children in unusual situations and also give a comprehension of the whole problem of their relation to a public utility. This is done through direct instruction in everything that relates to street control and the relation of children to it.
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> V. The result of this instruction which has been carried on throughout the city this year is one death in street railway accident to a child of school age in St. Louis in the first eight months of the year as opposed to an average of six covering a number of years and an increasing number from year to year.

An electric railway could do no better service to a community nor to itself than to furnish this book to the schools in its locality and see that it has at least a fair trial and chance for adoption.

SOME OTHER THINGS THAT CAN BE DONE

Among other helpful agencies, a properly formed vigilance committee, to report to the proper authorities traffic violations but not to make arrests, is proving a valuable aid in several cities. Chauffeurs' schools, as conducted by local councils and by some of the truck manufacturers, are showing unexpected attendance and are demonstrating that the men who drive for hire, and particularly those who drive commercial vehicles, are as a class far more interested in driving safely and carefully, or at least in making a study of safe driving, than are those who own cars and drive them merely incidentally. The good truck driver who is sure of his ground is himself a valuable traffic officer. The council has worked out a series of twelve lessons, of which more than 60,000 sets have actually been sold before publication.

The placing of bulletin boards in garages and at gasoline stations, changed often enough to keep them clean and presentable; the painting of white lines on the street, establishing of safety zones, placing of traffic lamps and caution signals, are all part of the safety movement, which do not call for any special comment at this time.

One of the most effective measures yet devised was the formation of a "Safe Drivers' Club" in Milwaukee in connection with the recent convention there. Although no organized efforts toward public safety had ever been attempted in that city, the officers of the council, in co-operation with the Association of Commerce and the public utilities of the city, had, within sixty days of its inception, enrolled between 10,000 and 12,000 members at a fee of $1 each, thus combining the value of the personal interest of that number of individuals with a very substantial financial foundation for further work. The details of the methods used are being formulated and will shortly be available for other communities. St. Louis expects to form such a club with at least 25,000 members.

Every city should have a strictly enforced ordinance calling for registration and examination of every individual who operates an automobile and providing for the suspension or revocation of the driver's license for cause.

A FINAL WORD

It is, of course, the desire and the duty of every official of an electric railway to serve the interest by which he is employed and in the furtherance of that duty to use his best endeavor to make the financial accident burden bear as lightly as possible upon the balance sheet, but one who has entered upon a study of the prevention of maiming or death by accident cannot go far without realizing that there are much greater obligations and rewards than those indicated by figures preceded by a dollar mark. It has long been said that "a corporation has no soul." Let not the same be said of those who are given authority in these public service corporations and who may, by a proper exercise of that authority, help to make the highways of our cities safer for our people.

Purpose and Organization of the Super-Power Survey

By W. S. Murray
Chairman Super-Power Survey, United States
Geological Survey

Studies Which Will Lay the Foundation for Allocation of Wastes in Power Production and for the Elimination of These Wastes Will Constitute the Survey

W. S. MURRAY

ANY man who knows that the steam freight locomotives of today waste three out of every five tons of coal that they burn and at the same time knows that there are means available to eliminate this disastrous waste of the nation's natural resources cannot keep silence. If that same man knew that a similar waste of fuel was going on throughout the factories of this land, and that this in turn could be corrected, for him silence would indeed be consuming.

These are a part of the conditions that exist. Now, what do they represent in cost to the nation? At the lowest estimate they cost $300,000,000 per annum, which figure will be doubled in four years if the rate of our industrial expansion continues on the order of past progress. But, alas, these very wastes, this improper form of power production and distribution, if continued, will throttle our expansion, and in lieu of progress we shall continue to wallow in our wastes.

The two giant arms that support industrial expansion are power and transportation. The present inhibition of their development is the common knowledge of the nation. When a ton of freight moves but five miles a day and this keeps up for a solid month; when a public utility central station system must refuse an offered load of 100,000 kw., crying "No capacity"; when—but why go on? Were the situation not so paralyzingly serious it would be ridiculous. We are nothing less than nationally negligent to acknowledge such a situation and not act upon it, and with all the world's progress in our hands if we are but moved to action. It would be to betray a trust of national sincerity not to speak thus frankly. I do not fear, but rather detest, the man who says, "Oh, everything is all right; this last year has been the biggest year of my life. I have made more money than I ever made before." That is a man not to be feared, but he is the man to be reached, and the sooner we segregate all of his type the sooner we shall allocate our distressing wastes.

I have been propelled to a conclusion which, if the judgment of engineering is taken seriously, should bring progressive alarm in what is at present a negative and false progress. I hope that within the specific confines of the training of my associates on the super-power survey and myself we may point a way in our report looking toward a power policy which will "kill" the inhibition now controlling the two great adjuncts of our national industrial progress—power and transportation.

Power is the father of all accomplishment; moral, intellectual and physical. High load factor is the measure of successful operation in every business. Its importance of application can find no greater field than in the generation and distribution of power. Good business is entirely dependent upon good agencies. Electricity is the most economic and is the true agent of power. Steam increased the power of man a hundredfold; electricity repeated this multiplication.

Load factor is the ratio of average to maximum load. Conditions exist where load factor may be 100 per cent. The average load factor of the steam locomotive is less than 10 per cent. Even the average load factor of our central stations is less than 35 per cent. The average load factor in the great zone of the super-power survey is 15 per cent. Such a figure comprehends the present operation of the railroads and industries of the super-power zone.

This brings us to the specific problem of the super-power system. What does it portend? In a territory, approximately speaking, between Boston and Washington, averaging 150 miles inland from the coast and comprising withal some 60,000 square miles, such a territory representing 2 per cent of the land area of the United States, there is a demand in machine capacity for 17,000,000 hp., divided 10,000,000 hp. for the industries and 7,000,000 hp. for the railroads.

Through the application of a plan outlined below, the load factor can be lifted from its present value of 15 per cent to 50 per cent. Capacity can be conserved threefold; that is, one horsepower can be made to do the work of three and one pound of coal of two.

AN ANALOGY FROM THE MINING FIELD

Some years ago in the great mining district of Logan County, West Virginia, there was installed in scattered plants some 4,000-hp. capacity in boilers, the steam from which supplied the power mains of the mines. Today the power from a 500-hp. boiler, converted into electricity, takes its place. Here is a conservation of capacity in the ratio of eight to one; a very large conservation made possible by the great diversity factor existing in the mining industry. The example serves, however, as an excellent illustration of what may be done in the great territory now under consideration.

As in Logan County, where the mines now receive their power from one common bus, so in the super-power territory it is proposed to deliver power to a great transmission and distribution system fed by high-power, high-economy, steam-generating stations erected at points on tidewater and at mouths of mines where condensing water and coal storage are available. Added to such a supply of power will be that obtained from the great rivers of this territory, the Delaware, the Susquehanna and the Potomac. Reaching into this area of 60,000 square miles may come the great water powers of the St. Lawrence, which will supply the New England districts of the zone. Every kilowatt-hour of energy so supplied will conserve in nature's storehouse two pounds of coal which would have been required to replace it. Threading through the super-power zone will be a trunk transmission system which will be common to all of these great sources of power, in which will be included also the great central stations of the character now built at Boston, Providence, New York, Newark, Philadelphia, Baltimore and Washington.

Approximately speaking, there will be some 2,700,000 kw. of new capacity to be added to that of the great stations just named and their function will be to furnish the base load in this great power reservoir for joint use by the railroads and industries. This, it is believed, can be done at an expenditure of from 1 to 1½ lb. of coal per horsepower-hour; the peak loads being furnished from the present stations.

Contrast this with steam locomotives now using 7 lb. of coal per horsepower-hour, and again with the factory use of coal at even a greater rate. With these figures before us it is but a simple calculation in arithmetic to show that a saving of 30,000,000 tons of coal per annum is a conservative estimate for this zone now using 25,000,000,000 kw.-hr. a year and with the demand for power doubling itself every four years.

From information already secured, it appears that the average capacity of a central station in this zone is on the order of 3,000 kw. How can such a station compete in the economic production of power with one one hundred times as large. It is quite possible that the super-power system will justify the installation of 300,000 kw. or more in a single station.

DENSITY OF TRAFFIC THE DOMINATING ELEMENT IN ELECTRIFICATION

The conservation of 30,000,000 tons of coal means a direct saving of $150,000,000 per annum, and there may be added to that figure $150,000,000 more due to the lesser cost of maintenance of electrical as compared with steam machinery. In the latter figure are also included certain savings effected through the reduction of train-miles by virtue of the higher speeds and the higher tractive efforts obtainable in the electric locomotives.

But not all of the steam railroads in this territory are to be converted for electrical operation. Only those where the density of traffic justifies will be electrified. Density of traffic is the prime and true factor in the determination as between the economics of railway operation by electricity or by steam. In the matter of electrification the three great economic components of density lie in the saving of fuel, motive-power repairs and train-miles, these with reference to open-track operation. While the economic considerations are most important in the matter of yard and terminal electrification, here the physical conditions in their relation to outside trackage may be controlling.

A point of paramount importance in this connection is that the present rights of electric public utilities, their entities and their franchises, are sacred. These and their vested interests must be respected. The super-power system is not suggested as competitive with existing power agencies. It is suggested that they carry on in larger degree and to higher economies the work so ably started and now being carried on. They have made possible the super-power system. I have been called the "father of the super-power system" because I visualized the zone of such an application between Boston and Washington. Dr. George Otis Smith, director of the United States Geological Survey, has well said "that no particular man could be considered the creator of the super-power system idea; that it has come as a matter of gradual evolution." I agree with Doctor Smith, but I would go further and say that the electric public utilities are the true parents of such a system.

Let us think for a moment what the saving of 30,000,000 tons of coal a year means. As a miner will do well to average a thousand tons a year, 30,000 miners become available either for other work or continued mining productivity if 30,000,000 tons can be saved. Coal is fighting with the finished and unfinished products in the yards, sidings and on the main lines of the railroads, and it occupies 40 per cent of the total cargo space now used. I shall not attempt to follow this 30,000,000 tons of coal back to the mine from tidewater, but every ton of it will probably average 200 miles in transportation. Think of the release of cars for other service, the saving of coal now burned to haul coal, and the rendering available of train crews for productive rather than wasteful effort.

WATER POWER A SMALL BUT IMPORTANT FACTOR IN THE SUPER-POWER ZONE

Let us now for the moment drop coal power and think of water power. Large as are the rivers in the super-power zone, their contribution to the power requirement will be less than 15 per cent of the total. Small as this may seem, yet so great is the value of this water power in its contribution to conservation that every respect must be accorded the power to be obtained from such a source. However, the necessity of addressing ourselves to the problem of producing power with coal at the highest efficiency is the urgent matter, for in four years the proportion of water power to steam will sink to 7½ per cent of the total.

Today we build a plant and a quarter for every one we require, because we place in that plant spare capacity to guard against breakdown. While we are building these little plants, which uncompromising experience has taught us are inadequate to our industrial expansion, we pay twice as much per kilowatt of capacity as would be required in the large super-power stations, which can be built with capacity which not only cares for the present but for the future also.

Recently, Philip Torchio, electric engineer, New York Edison Company, cited a dilemma in which this great company found itself when an unusually black thunderstorm enveloped New York City. So much darkness was substituted for light that with the switching on of the load the great plants of this system were taxed beyond their immediate operating capacity. The steam pressure in the boilers fell to a dangerous limit and the situation was only partially saved by the switching on of some available storage battery capacity. This peak, in midsummer, was greater than any peak during the winter months. Had the New York Edison Company been a part of a super-power system it would have been possible to have supplied not only the 60,000 kw. required but probably twice that amount within five minutes. The power might well have come from Niagara Falls or the St. Lawrence River, to say nothing of the possibility of it coming from one of our own rivers in the immediate vicinity, such as the Delaware or the Susquehanna. Or still again it might have been supplied from one or two steam turbo-generators located in a super-power station either at tidewater or at the mouth of a mine.

"Facility" a Characteristic of Electric Power

Electricity has long been known as an agent of the highest efficiency in the matter of transmission and distribution of power. We are coming now, however, to a fuller recognition of its efficiency as an agent of facility. Because of the possession of these two elements, electricity is an effective weapon with which to vitalize the fibers of our power and transportation resources. The slogan of this country's future progress is "Produce!" and then "Produce More!" Let us facilitate manufacture and speed up the production of our factories by speeding up the railroads that transport their finished and unfinished products. All the elements of a steam locomotive are conducive to delay. The electric engine has 6,000 out of the 8,760 hours a year available for revenue work; the steam engine but 2,500. The capacity of the electric engine is maximum when we need it the most—in winter. The steam engine during this crucial period offers its minimum capacity for service and is never dependent upon the human arm; the arm behind the electric engine is machine-made.

In a trip throughout the super-power zone to meet the executives of various railways, public utility companies and industrial chiefs, while expecting a sympathetic point of view on their part, I have been amazed at the alacrity of their offers of assistance, backed up by the flood of information pouring in as the result of questionnaires addressed to them. This leads me to describe the organization by means of which we are securing the information necessary to our report.

As to the Survey Itself

The objects of the super-power survey are two: (1) The allocation and valuation of the waste incident to the present improper forms of power production and distribution and (2) the recommendation of a regional plan by means of which this waste can be eliminated. Through President E. G. Buckland of the New Haven Railroad, who has ever had New England's interests at heart, I met Secretary Lane and laid before him the plan of the Boston-Washington super-power system. The plan was indorsed by the Secretary and Dr. George Otis Smith, under whose department, the United States Geological Survey, the power survey is now being conducted. Then followed presentation to Congress, action being delayed on the bill due to President Wilson's absence from the country. On presentation, however, to the Sixty-sixth Congress, Judge Payne, who indorsed the plan, having then become Secretary of the Interior, it passed both the House and the Senate, was approved by the President, and it now forms a part of the sundry civil bill for 1921.

I take this opportunity to express appreciation of the broad-minded policy of Doctor Smith, to whom I report as chairman of the super-power survey. To Director Smith I outlined the engineering policy which I believed should be followed in the conduct of the survey. First I believed that it should be divided into two principal parts; the first consisting of an engineering staff, the second of an advisory board. The engineering staff was to comprise three departments of investigation, one for power and transmission, one for railways and one for industries. Working with these three departments I suggested an engineer-secretary, to co-ordinate and prepare the field data collected by the departmental organizations for the report text. The advisory board was to consist of men representative in the fields of power production and power utilization, who were looking toward the establishment of a national power policy. Doctor Smith approved and accorded to me the duty and privilege of appointing, for confirmation by the Secretary, the members of the engineering staff and the advisory board. The work of these bodies will be better known after the report has been completed and made public.

On our advisory board appear such names as Breckenridge of Yale, Buckland of the New Haven, Hardin of the New York Central, Alexander, executive director National Industrial Conference Board; Edgar of the Boston Edison, Sloan of the Brooklyn Edison, Pardee of the American Electric Railway Association, Little, America's foremost chemist and the author of "Rehabilitating the Estate"; McGraw, the head of technical publicity in this country, and last, but only because he joined last, Herbert Hoover, representing mines.

Throughout the trip from Boston to Washington it seemed as if every man wanted to impress upon me that what we needed most was a sufficiency and a reliability of power. The cry for power seemed to pervade the atmosphere, and when that was not mentioned, coal, or rather the lack of it, took its place. Every one seemed to say, "When the foundation is laid for the super-power system, see to it that you know where your coal is coming from, and how you are going to get it," and "See to it that your power-plant capacity is sufficient not only to take care of this immediate present but the future as well."

The Mining End of the Problem

This leads me to the great mining problem, so intimately related to the super-power system in securing continuity of power. None of the super-power stations should, I think, be erected within the confines of large cities. Around them should be placed ring buses from which power may be drawn, and the new super-power stations should be built far outside the limits of such cities. A prerequisite of as much importance as securing water is that of securing ground for coal storage. Such storage will amount to millions of tons and will be a regulating feature paramount to a continuity of power production, while answering also the fluctuating labor conditions at the mine.

The great coal roads to the mines must be "revamped," and these will offer opportunity for electrification, even outside the immediate limits of the electrification zone, to permit the speeding up of that important traffic. It is patent that if, by the means described, we can make one ton of coal do the work of two, the effect will be simply to accelerate the expansion of our industrialism. Thus these same coal roads will be required to handle more, rather than less, coal.

We are looking toward the establishment of power continuity, among other things, through the selection of a coastal point where three co-ordinated plants may be erected; one a coaling station where the coal can be received in bulk from the mines and loaded into barges for transport by sea to the super-power stations erected at tidewater; another a power station generating its quota of energy for the super-power system, and a third, a byproduct plant which will extract the gas, ammonium sulphate, benzol, tar and coke. The coke will be used for metallurgical or power purposes as conditions may dictate.

The growth of the power demand in this country is not in proportion to the growth of population, but at a rate much higher. During the last ten years the horsepower per wage earner has increased 25 per cent. The wages of labor in this country have risen far above those of other countries, and therefore it is to machine-made power and not to man-made power that we must look in order that American industry may fairly meet the competition of the rest of the world.

The northeast seaboard, of which the super-power zone forms the most important part, is the finishing shop of American industry. Into it flow the country's raw materials, and when the highly skilled and highly paid American labor has turned them into finished products our new merchant marine, with its building record of 6,000,000 tons in a single year, stands ready to secure our supremacy in world trade.

In conclusion, I desire to outline a few salients which stand out in the consideration of the establishment of a national policy. These are:

1. Power is the father of all accomplishment, moral, intellectual and physical.
2. Power in the form of coal is maximum in bulk and minimum in efficiency; in the form of electricity it is minimum in bulk and maximum in efficiency.
3. We have spent billions to develop the natural resources of the United States and render them available. Can we now afford to throttle the burst of industrial expansion which is upon us, not only for ourselves but for the world, by refusing to recognize the necessity of stimulating the two giant arms which are supporting it —power and transportation?
4. We have spent billions in destruction for preservation; now let us spend billions in construction for conservation!

Stores Accounting as a Means to Stock Regulation*

By R. A. Weston
Certified Public Accountant
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By Means of Careful Attention to Store Accounting Necessary Stock to Keep in Store May Be Kept to a Minimum—Possible Savings for All Electric Railways Estimated to Be as Much as $7,500,000 to $15,000,000 Annually

R. A. WESTON

BY THE term "Stores accounting as a means to stock regulation," I mean a regulation of the amount of stock to be carried, so that, on the one hand, there will be a minimum delay, or expense due to delay, by not having material on hand when it is wanted for use in repair work, and, on the other hand, there will be a minimum amount of the company's cash capital tied up in the inventory, thus enabling such capital to be put to other uses.

Not only is it disadvantageous to tie up the funds so that they cannot be used, but it is a matter of serious expense to carry surplus material in stock. It may at first be thought that the expense is only the amount of the interest on the capital invested. This is far from all. There is in addition the cost of handling the material when received, and at inventory times, and when rearranging and straightening out the storehouses; there is the loss of the use of the storage space occupied by the material; there are taxes and insurance; there is more wastefulness occasioned on account of having an abundance of material, and a disinclination to make use of serviceable second-hand materials; there is the cost of unnecessary transportation over longer or shorter distances, and finally, and perhaps more important, there are the losses due to deterioration and obsolescence. All this expense has been variously estimated as amounting to from 15 per cent to 30 per cent per annum, depending upon the value of the material.

The storekeeping problems of a railway company are quite different from and much more difficult than those of a manufacturing industry. In the latter case the management determines what the production is to be. The production engineer prepares plans and bills of material and the definite quantities are ordered that are known to be needed and must be used in the manufacture. Within a reasonable time after it is received the material is all used.

With a railway it is quite a different matter. Omitting the consideration of new construction work, the problem is one of repairs and upkeep, and it is not possible to determine definitely and exactly in advance just what repairs are going to be necessary, or just when it is going to be necessary to perform them. These things depend upon the quality of the materials that have been used in the construction and the skill with which the work has been done, the action of the elements, unforeseen accidents and emergencies and the policy, or the ability, of the company with respect to the state of repair in which it keeps its property, or allows it to depreciate. A stitch in time saves nine, but sometimes it is not possible to take the stitch in time and then the nine stitches become necessary.

Experience has proved that in the long run the law of averages is the best guide to go by in maintaining a stock of material for repairs and renewals; the average of past consumptions when similar conditions have obtained. Such a record, to serve as a basis for ordering, is immeasurably better than the estimates that will be made by shop, track or line foremen of the quantities that are going to be required, in a given period, for ordinary maintenance work. Of course such records need to be supplemented by special knowledge, or special orders relating to character of work laid out to be done, and the tendency of equipment to become obsolete and to be superseded by improved designs must always be borne in mind and considered in determining quantities; but with all such reasonable limitations, past consumption is the best guide to follow.

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*Abstract of paper presented at annual convention of American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 12, 1920.

HOW CAN ACCOUNTING REGULATE STOCK?

This being the case, how shall we shape our accounting tools so that they will afford the guide to assist us in properly regulating our stock? If we can make our records show us in a practical way what the periodical consumption of material is, that will guide us in the quantities to order and maintain in stock.

To take a concrete example. Let us suppose that our record shows that we use on an average 200 trolley wheels per month, and that this consumption has varied between a minimum of 160 and a maximum of 240. Let us further assume that it takes thirty days after placing an order for trolley wheels before they are delivered.

If we regulated our stock so that, in each month, we had available for use 240 or slightly in excess, we then would consider that we were protecting the service with a minimum of stock on hand. If we had an average of 240 available for use each month and an average consumption of 200 per month our per cent of disbursements would be 200 ÷ 240, or 83⅓ per cent. Our stock on hand at times would tend to approach 40, which would be only a six-day supply. If we had to divide our stock and distribute it in several places, and if deliveries were somewhat erratic, we would be working on too low a margin. The storekeeper would be more likely to feel that his average stock balance throughout the month should not fall below a month's consumption, or 200. Working on that basis, he would be always maintaining a stock of 200 and receiving and issuing 200 besides. This would mean that he had available 400 in the month and used 200, and his rate of disbursement would be 200 ÷ 400, or 50 per cent.

With other stock items the case will be different. Let us take the case of a set of armature coils for a large generator in a main power station. A set of such coils is held in stock to guard against an interruption to the service. It may be months before such an item is used. It may even never be used, but must be carried as an insurance against interruption. Here we have an instance where the percent of disbursements will be zero.

With regard to practically every item of material carried in stock, the storekeeper will find that experience will enable him to determine a minimum stock that can be carried with safety. This will vary with different kinds of material, market conditions, time required for delivery, effect of the seasons on consumption, etc. The point I want to make is that experience and good records will show, within quite close limits, the goal to work for or the size of a properly regulated stock.

It is impracticable, however, for a general officer to attempt to govern the regulation of the stock, through lists of all the stock items, and the quantities available and consumed, as per our illustration. There are too many items; the list would be too long; time would not permit. The same relationship can be shown just as well by considering the money value. This gives us a common unit for all items of material, and enables us to group items into classes, and reduce to dollars and cents the aggregate, for the class, in material available, and in material used.

Therefore we may say that the first step in the regulation of stock should be a classification of the materials carried and used. If we can make this classification a standard classification that can apply to railways in general, we will have accomplished a further step of great importance, because we then afford a means of comparison between roads. We can

MATERIAL STOCK REPORT, ALL STORES, DECEMBER, 1915

	—Purchased—		—Transferred—						—Transferred—						
On Hand First of Month	Vouchers	Freight Charges	From Other Classes	From Other Stores	Received by Credit	Total Available for Use	Classes of Material	Used	To Other Classes	To Other Stores	Sold	Total Disbursed	On Hand Last of Month	Percent Disbursed to Total Available	Working Stock
220,597	269	3	5,881	6,901	1,381	235,032	1-A Frogs, switches, crossings and parts	9,736	1,993	6,336	97	18,162	216,870	4.4	
192,275	38,293	738	1,426	8,099	292	241,123	4 Lumber and piling for bridges, buildings, fencing, etc.	33,920	1,645	6,404	335	42,304	198,819	14 8	
							Total, Maintenance of Way and Structures								
301,762	12,673	146	4,073	6,252	55	124,961	11 Bolts, nuts, washers, etc.	11,760	1,424	6,480	157	19,821	105,140	10 4	12,372
68,686	22,224	5	5,317	5,695	574	102,501	21 Brass castings and journal bearings	28,226	3,427	5,667	103	37,423	65,078	31 0	8,663
							Total, Maintenance of Equipment								
51,492	12,264	59	3,157	8,163	118	75,253	36 Locomotive, train and station supplies	15,338	217	8,145	143	23,843	51,410	24.2	1,021
							Total, Conducting Transportation								
56,175	274	82	......	11,769	50,229	118,529	50 Scrap—Except rail	1,060	842	11,904	59,778	73,584	44,945	57 0	
3,397,512	342,903	7,308	132,624	152,524	153,499	4,186,370	Grand total	451,121	132,625	152,523	85,696	821,970	3,364,400	13.8	90,671

FIG. 1. MATERIAL STATEMENT. FIFTY-EIGHT CLASSES OF MATERIAL ARE PROVIDED ON THIS BLANK. TYPICAL CLASSES AND TYPICAL FIGURES ARE GIVEN IN THIS EXAMPLE

compare our performance with that of our neighbor, and profit by his experience and attainments. Now a classification of material was recommended for steam roads by the Railway Storekeepers' Association, at its convention in St. Louis in 1910. This was later incorporated in the "Rules for Railroad Store Department Operation," by the Director General of Railroads, under federal control. With one or two unimportant additions, this classification can be equally as well used by the electric roads. Under it, all materials will be included in about fifty-eight groups or classes. The names of these classes are shown upon the material statement, which illustrates this paper and to which I now refer. It will be noted that on the statement the classes are grouped according to the I. C. C. general accounts. This frequently enables very interesting statistics to be presented to the operating department officials.

AMOUNT OF MATERIAL RECEIVED, PERCENTAGE DISBURSED AND COST PER $1,000 FOR HANDLING
MONTH OF JUNE, 1915 AND 1916

Storehouses	Year	Amount on Hand First of Month	Amount Received During Month	Total Debits	Material Disbursed During Month	Balance on Hand Close of Month	Percentage of Stock Disbursed	Day's Supply on Hand
"A" Storehouse	*1915*	*718,285*	*163,927*	*882,212*	*163,864*	*718,348*	*19*	*128*
	1916	1,231,481	348,968	1,580,449	244,914	1,335,535	15	170
"B" Storehouse	*1915*	*280,237*	*78,743*	*358,980*	*80,181*	*278,799*	*22*	*106*
	1916	380,729	94,571	475,300	85,827	389,473	18	137
"C" Storehouse	*1915*	*366,751*	*41,180*	*407,931*	*46,921*	*361,010*	*12*	*220*
	1916	373,739	164,425	538,164	136,783	401,381	25	90
"E" Storehouse	*1915*	*58,458*	*41,741*	*100,200*	*37,869*	*62,331*	*38*	*49*
	1916	68,468	37,914	106,382	32,548	73,834	31	67
"F" Storehouse	*1915*	*162,363*	*72,893*	*235,256*	*74,440*	*160,816*	*32*	*64*
	1916	174,974	127,774	302,748	111,423	191,325	37	51
System totals	*1915*	*3,397,502*	......	....	....	*3,364,417*	.	...
	1916	4,165,358	......	.	.....	4,381,192		...

FIG. 2—CONSOLIDATED REPORT FROM ALL STORES

Each store of the system will have a material classification ledger, in which will be kept an account with each class of material. The class will be charged with the inventory and with the receipts and will be credited with the materials issued and used. These accounts will be controlled by the one account of "General Stores" in the general ledger. When the accounts are closed each month a statement will be drawn off the ledger on the statement form to which I have referred.

It will be noted that this form shows certain information each month about each class of material. The left side of the form shows what is started out with, and then what is received, showing also the source from which it is received. These are totaled to show all the material that was available for use. The right side of the form shows the disbursements and how the materials are disbursed and what is left at the close. Column 14 is very important, being an index figure for each class, to show the percentage of disbursements to the total material available. Column 15 shows the value of working stocks or fixed repair stocks that are carried at small points, too small at which to keep a storekeeper and maintain a detailed accounting. Column 16 shows the value of special materials included in the stock for new construction and authorization work. These amounts are oftentimes large and important and are usually beyond the control of the storekeeper. The construction work may be delayed, or deferred, so that the material really constitutes so much inactive and dead stock, and it is desirable that it be possible to segregate it in the statements so that they will not be distorted and misleading.

The information contained in this report permits an intelligent judgment to be formed, in considerable detail, as to the efficiency with which each store is being managed, and, by a consolidation of all reports into one report, a judgment as to the department as a whole. It is a report that needs to be studied by the storekeeper, the general storekeeper and the executive who has jurisdiction over the department.

On the form that I have used for illustration, some figures have been placed that are illustrative of actual operating conditions. It is interesting to note how the percentage figures vary, in the different classes. As previously stated, for a particular store, or for a particular road, it should be possible to determine, fairly closely, what the per cent of disbursements should be, or, in other words, how large a stock should be carried of a certain character based upon the amount of material being consumed. This gives a criterion by which to judge a storekeeper's ability. By making comparisons between stores, by making allowances for different conditions, by gradually bringing each store up to the mark of the one that makes the best showing, by establishing a mark at which to aim—all these things bring about a rise in the standard of operation, and a gradual approach to the maximum percentage, compatible with satisfactory service, and when this is accomplished we have obtained good regulation.

A good supply agent will aim to keep most of his surplus material at his main supply point and not permit its accumulation to any extent at division and small stores. He will also keep his dead, inactive and obsolete stock at his general store. Carrying out this policy, the stock at the other points should be fairly active in its turnover. Bearing this in mind, the material statement can be studied. No final conclusion can very well be drawn from a report for a single month, as a number of things might occur to make a report abnormal and misleading. It is from the average figures over a period of months that reliable conclusions can be drawn.

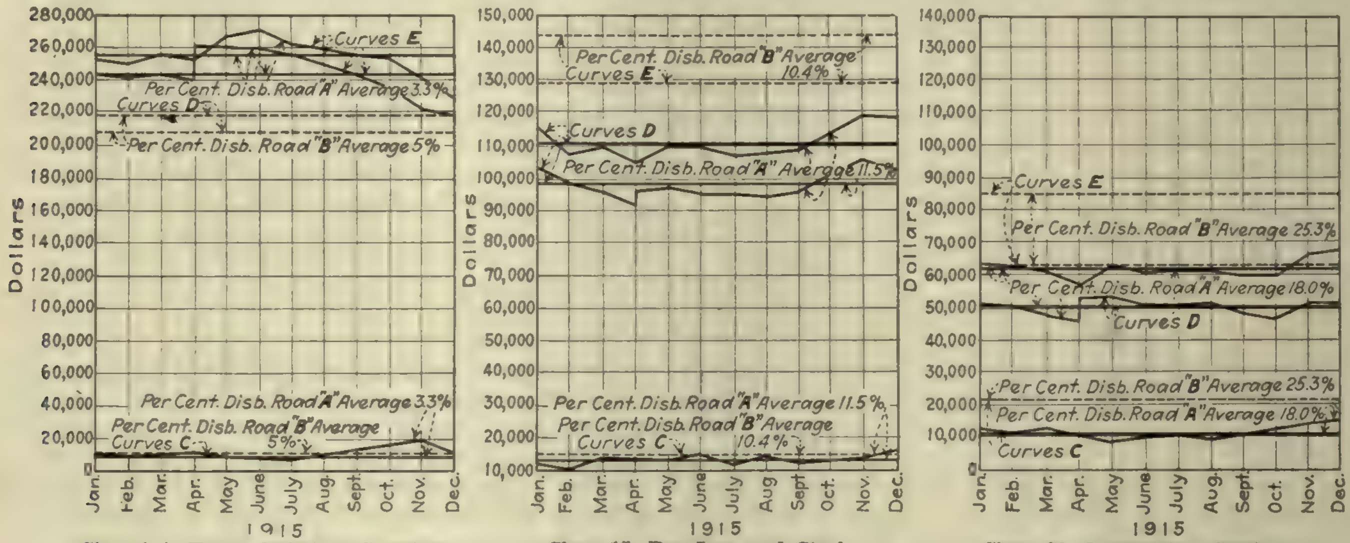
The supply agent can, after some experience, judge what each store's turnover ought to be for each class of material, and as a whole. Some classes of material should be turned over in thirty days, some in forty-five, sixty or ninety days. If the average does not show that this is being done, he can generally conclude that the investment at that particular store is higher than it should be and take the necessary steps to transfer some of the stock to the general store, thus making it more available for use on other divisions and reducing the investment on one division. This may save the purchase of some new materials and reduce the investment on the road as a whole.

The supply agent cannot, of course, tell from the statement the kinds and sizes of material that is surplus, but it tells him where to look, and he can then have examined the detail stock books, stock cards or stock sheets at the store for more detailed information.

The next step in the study, after that of the operation of each individual store, will be a study of the stock on the road as a whole. This study is made from a consolidated report from all stores made on the same form. In studying this report the effect of the transfers is eliminated. That is, material transferred is not material consumed, but remains available for use. The amount of the materials transferred may, in some degree, measure inefficiency, poor storekeeping and faulty distribution. Eliminating the transfers on the consolidated statement, the ratio which the material used and sold bears to the total available is the figure that tells the story.

Here again after a certain amount of experience it is feasible to determine what a minimum stock should be to fill the needs, give a reasonable service and hold down the investment in supplies. This minimum is the thing for which to work, holding it available for the very most elastic distribution and not permitting it to remain where it is not needed. It is of course absolutely essential that all material shall remain in stock account until used, and that there shall not be stocks of material that have been shipped to different parts of the road, and charged out, when shipped. This is not only bad accounting, although frequently done, but is fatal to control of stock.

These reports can be made to tell their story much more quickly and interestingly by means of pictures or graphic charts. Three lines on the chart, one showing total material available, one showing consumption and one showing stock balance on hand, will be found to be most satisfactory. These charts can be made for each storehouse and for the entire system, considering all the material as a whole, and also made for each class of material, for each store, and for the system as a whole.



Class 1-A, Frogs, Switches, Crossings and Parts. Class 15, Bar Iron and Steel, Sheet Steel, etc. Class 36, Locomotive, Station and Train Supplies

FIG. 3—SPECIMEN CHARTS, SHOWING DISBURSEMENT RATES AS COMPARED WITH STOCK ON HAND. VALUES ARE FOR TYPICAL STEAM RAILROAD ITEMS

Lower Line—Monthly Consumption. Middle Line—Monthly Stock Balance. Top Line—Monthly Material Available. Straight Lines Represent Yearly Averages.

Such pictures as these catch the eye quickly, and carry to the brain the salient points, that are lost and confused in a maze of figures. They show how conditions are tending, and permit prompt action to be taken, to prevent undesirable results.

While it is a good thing to have our reports show us what has happened when our stock has got somewhat out of control, so that we can curb it, it is a better thing if we can be told beforehand that such a thing will happen, so that we can stop it. Our accounting will assist us also in this respect. Surplus materials once got on hand are oftentimes most difficult to get rid of. They often remain for years, to clog the stock account and cause a poor operating showing in the store department. Care in ordering is of the utmost importance to prevent accumulation. An ounce of prevention here is worth many pounds of cure. Storekeepers are prone to order loosely and in excess of the real necessities of the case. This is not hard to understand, as their daily life with those who use the materials is apt to be more pleasant if they have an abundance of material on hand. It is also very hard for an approving officer to tell whether a storekeeper's stock requisitions are reasonable or not, in the absence of the necessary detailed information. Consequently most such requisitions are taken on faith and put through for the purchase. If, however, we cause our storekeeper to order his stock monthly, each class of material on separate requisitions, and have prices applied to the requisitions, it is comparatively simple to get the money value of the requisition, and another simple operation to look at the chart and see the value of the material that is being consumed, monthly, from that store. If the requisition should prove to be excessive, it can be corrected before it is too late.

A specimen copy of the material chart is given by way of illustration, as is also one other form which is in the nature of a comparative summary of totals by different store points. These forms, it is submitted, contain the essential features of the store accounting, to permit of accomplishing good regulation.

I would like to make a few comments on these charts and forms. Fig. 1 has been explained. Fig. 2 is a summary of grand totals by storehouse points. For comparative purposes it is well to group the stores together that have similar characteristics and that might be expected to produce similar results. On the specimen, storehouse "A" might perhaps represent the general store, being in a class by itself. Stores "B" and "C" might be of the next importance, such as principal division stores. Stores "E" and "F" might represent smaller points. Store "C" makes a disbursement of 25 per cent, which would suggest that store "B" ought to do equally as well and should be investigated. Store "C," it is also noted, shows an increase in stock during the month of $28,000.

Now by examining the material statement for each of these stores we can see quickly the particular classes in which "B's" percentage falls below that of "C," and also in what classes "C's" increase of $28,000 occurred. By looking back further to our storehouse charts of stores "B" and "C" we can see what has been the trend, in these classes, for a period of time, and thus get a clue to the classes in which the operation of store "B" is weak.

I would like now to refer for a moment to the specimen charts shown. One shows perhaps the hardest class to deal with on steam roads, namely, "Frogs, Switches, Crossings and Parts." Notice the tremendous stock carried during the year, of $255,000 a month, to provide for a consumption of only $8,000 a month. The chart shows the result of efforts made to bring this stock down, showing that the peak in June of $270,000 was reduced to $228,000, on Dec. 31. Another shows the class of "Bar and Sheet Iron and Steel." This is not so bad, showing a disbursement of 11.5 against 3.3 in the case of "Frogs, Switches, etc." The third, Class 36, "Locomotive, Station and Train Supplies," shows still better, or 18 per cent. The fourth shows all classes and an average of 13.8 per cent. The dotted lines show the averages of another road, of not dissimilar characteristics, and in the same section of the country, which shows a disbursement of 16.7 per cent. If road "A" had held its stock down, so that its consumption was the same per cent of its material available, namely, 16.7 per cent, its average investment in materials and supplies would have been about $2,800,000 instead of $3,500,000, or $700,000 less.

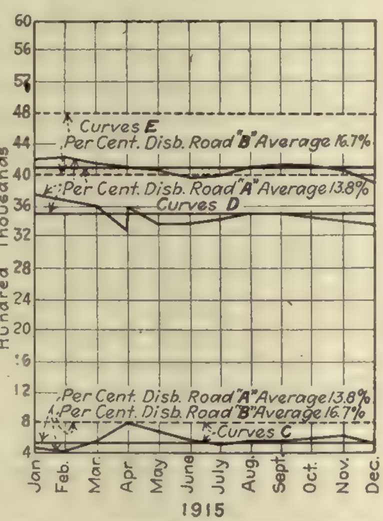


FIG. 4. SPECIMEN CHART SHOWING DISBURSEMENT COMPARED WITH STOCK ON HAND FOR MATERIAL

POSSIBLE ELECTRIC RAILWAY SAVINGS

Let us consider briefly what this might mean to the electric railroads of the country. The latest statistics that I have seen state the total mileage of the electric railways as approximately 48,500 miles. Moody's Manual for 1919 shows that fourteen representative systems, in different parts of the United States, having a mileage of 6,758 miles, were in 1918 carrying in their materials and supplies account approximately $19,000,000. In the same ratio the total mileage would be carrying $137,000,000. However, as the mileage included electrified steam roads, and as perhaps the mileage picked out may not have included enough suburban mileage, to be entirely conservative let us assume that $100,000,000 might be nearer correct. Moody's Manual does not publish any statistics relative to the value of material used. One system of considerable size, whose figures I have seen, was carrying about a million dollars in its stock account and had an average per cent of disbursements for the year of 9.1. This seems very low. Steam railroads in the same section of the country show 13 per cent to 17 per cent, and they certainly should do considerably better. Generally speaking, I believe the steam roads are more advanced in their storekeeping methods that the trolley roads, and I believe the turnovers of the steam roads are higher.

However, generally trolley systems are more compact than steam railroad systems and do not scatter their stocks so widely. This should enable higher percentages of disbursements. Therefore it would seem to me entirely reasonable that a trolley system should have an average of at least 20 per cent. If the road to which I have alluded had made such an average, its investment in materials and supplies would have been less by half a million dollars. If that system should chance to be typical of the electric roads in general there would have been a reduction in the investment for all of $50,000,000. I venture to say that at this particular time the executives could make very good use of this capital for other purposes. If this was surplus material, unnecessary to have been carried, and if it costs from 15 to 30 per cent to carry surplus material, there would have been a direct saving of from $7,500,000 to $15,000,000 of expense per annum. The saving of the transportation of this material, and of the raw material that had to be hauled before it could be manufactured, would certainly not have added any to congestion of traffic.

These figures may perhaps seem unreasonable or even visionary or absurd to you, but I am by no means convinced that they are either one or the other. When all factors are taken into consideration these figures are certainly well within the order of magnitude of possible savings.

An expert in the handling of materials and supplies speaking of the steam railroads of the country five years ago made the statement that the capital invested in materials and supplies on the railroads of the country was $240,000,000, and he estimated that $100,000,000 was surplus, unnecessary investment, resulting from absence of exact information in regard to handling this large investment, and a reluctance to depart from long-established precedent and custom. The carrying charges he estimated at 15 per cent to 20 per cent, which meant a wholly unnecessary expense of fifteen to twenty million dollars a year. In view of the vast increase in the value of stocks of material in the last five years, if these figures were revised to date they would probably be very much more startling.

The problem is a large one, difficult and complicated by various conditions. It requires all the light that can be thrown upon it. If a better and more scientific accounting method is a key to the problem, and I believe that it is, then the accounting departments of the railways have a very important field in which to expend some of their energies.

The Motor Bus as a Supplement to Electric Railways*

By R. Gilman Smith
Milwaukee Electric Railway & Light Company

Its Place Is in Extension of Car Lines Into Territory of Light Traffic Possibilities and Over Routes on Which Extra Fares Can Be Charged

R. GILMAN SMITH

THE present discussion will be limited to a consideration of the various factors affecting the advantages or disadvantages arising out of the use of motor buses in conjunction with an electric railway system. Such use will in general classify as follows:

(a) The operation of motor buses over routes forming extensions of existing electric railway routes.

(b) The operation of motor buses over routes independent of electric railway routes.

(c) The operation of motor buses over routes identical with electric railway routes.

With any of the three types of service just enumerated the motor bus may be operated as an integral part of an existing railway system, or it may be operated as a separate transportation agency furnishing a special class of service.

In making an inquiry as to whether motor bus or rail service is the more economical and at the same time the more satisfactory type of installation, a consideration of the local requirements plays an important part. These requirements differ widely under different local conditions of operation and have a marked effect upon the costs of the service to be furnished. Some of the factors to be considered are as follows:

(a) Volume of traffic.
(b) Distribution of traffic throughout the day.
(c) Frequency of stops.
(d) Character of pavement.
(e) Climatic conditions.
(f) Operating costs.

Motor bus service is especially adaptable where the traffic to be handled is more or less uniform throughout the day. The motor bus has a limited overload capacity and is not suited to care for rush-hour crowds. If peak-load conditions must be met, it requires the operation of a large number of additional units of equipment for a few hours daily, the fixed charges on which may offset whatever differential in operating costs there may be as compared with rail service.

The present rush-hour conditions in most American cities necessitates the operation during the morning and evening peak-load periods of approximately double the number of cars in use during the remaining hours of the day. This means that the actual carrying capacity of the system is increased during these periods by 100 per cent plus the amount by which the maximum load of cars exceeds the seating capacity. For a standard double-truck car this is an increase from about fifty passengers to about one hundred, or an additional 100 per cent, making the traffic ratio four to one. For a safety car the corresponding increase is from thirty passengers to about sixty, or the same percentage.

If this peak-load traffic is to be handled by motor bus, the smaller over-normal capacity of the bus will necessitate a greater increase in short-hour service. A large double-deck bus with a seating capacity of about fifty has a maximum capacity of not more than seventy, an increase of 40 per cent. A large single-deck bus seating twenty-four has a maximum capacity of forty, an increase of 67 per cent. This indicates that to obtain an equivalent increase in carrying capacity the number of bus units operated during the peak load periods would have to be increased by 120 per cent to 140 per cent over the base schedules, as compared with an increase of 100 per cent in the number of rail units.

The character of the street surface over which a motor bus is to be operated has a considerable effect in determining the desirability of the service. In the suburban districts of many cities the unimproved condition of the streets would make the operation of this type of service very difficult, and would at the same time decrease the initial investment required for the installation of rail service.

Another point is that, in Northern cities, climatic conditions experienced in winter raise serious problems. The transportation difficulties encountered in New York City as the results of the severe blizzards in the spring of 1920 indicate the helplessness of the motor bus as a snow fighter. A four-motor double-truck car or snowplow running on rails has at its disposal not only an unlimited supply of electric energy but also a large amount of kinetic energy arising from its weight. This can be effectively utilized in fighting snow by bucking large drifts at relatively high rates of speed. For equipment operating on rails this is a comparatively safe procedure. A motor bus or an auto truck equipped with a snowplow and depending upon a slippery pavement for its traction cannot safely fight the drifts in this manner.

COMPARATIVE COSTS THE CRITERION

The question of comparative operating costs for bus service and rail service is a vital one in an inquiry as to which of the two is the proper installation under a given set of conditions. Unfortunately data covering the operation of bus lines for recent periods are available in a limited number of instances only, and in the material available the detail underlying the total figures is not always known. The American Electric Railway Association recently published as a summary of the replies to a questionnaire on this subject its Data Sheet No. 201, containing data for seven companies which

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*Abstract of paper presented at the annual convention of the American Electric Railway Association, Atlantic City, N. J., Oct. 14, 1920.

TABLE I—MOTOR BUS OPERATING DATA
(From A. E. R. A. Data Sheet No. 201) August 31, 1920

Name of Company and Location	One Way Mileage	Miles per Bus per Day	Number of Buses Operated	Average Passengers per Bus Mile	Seating Capacity per Bus	Operating Revenue per Bus Mile	Operating Expenses per Bus Mile
Fort Worth Auto Bus Company, Fort Worth, Tex.	4.90	33.4	8	1.80	17	$0.18	$0.47
Fort Wayne and Northern Indiana Traction Company, Fort Wayne*	2.25	159.6	2	1.26	16	06	.12
Connecticut Valley Street Railway, Greenfield, Mass.	3.14	135.0	2	3.58	19	22	.17
Minnetonka & White Bear Navigation Company, Minneapolis*	3.80	144.0	13	3.53	14	18	35
Baltimore Transit Company, Baltimore, Md.	2.90	78.0	18	4.80	16	34	.37
Manufacturing company in city of 200,000	2.00	124.0	[illegible]	8.81	21	37	.36
Experimental operation in city of 400,000*	....	89.9	1	4.00	15	20	.22

*Operation abandoned.

are now or have recently been operating motor bus service. These seven companies show revenues per bus-mile ranging from six to thirty-seven cents and operating expenses from twelve to forty-seven cents per bus-mile. The number of passengers per bus-mile runs from 1.26 to 8.81, and the average bus-mileage per day per bus from 33.4 to 159.6. Two out of the seven companies had operating revenues per bus-mile in excess of the operating expenses shown; in one case the revenues exceeded the expenses by 1 cent per bus-mile, and in the other case by 5 cents per bus-mile. No fixed charges are included in the figures quoted. A summary of these figures is shown in Table I.

Operating costs have fluctuated so widely during the last two years that it is difficult to set up a statement of comparative unit expenses for rail and bus service. Such a set-up has, however, been attempted by developing certain figures from the experience of various companies, and by estimating certain others on what would appear to be reasonable bases under normal operating conditions. The result shows that the direct operating costs, including only maintenance, operating labor and supplies, power and general expenses, but excluding taxes, depreciation and return, are as follows for four more or less standardized types of equipment:

Double-truck—two-man—car	33.75c. per car-mile
Safety—one-man—car	21.50c. per car-mile
Double-deck—two-man—bus	39.10c. per bus-mile
Single-deck—one-man—bus	27.00c. per bus-mile

The above costs include for the rail service allowances of 2.5c. and 2.0c. per car-mile respectively for the double truck and the safety car for the maintenance of way and structures, and an allowance of 0.5c. per bus-mile for snow removal. Drivers' wages are figured at seventy cents an hour, and the average speed of operation is taken as 9 miles per hour for all rail service and 10 miles per hour for bus service.

If allowance be made for taxes at 2 per cent per year, depreciation at 5 per cent per year on cars and 25 per cent per year on buses, and 3 per cent per year on general equipment and power equipment, and for return at 7.5 per cent per year the unit costs will be materially increased. Assuming an annual mileage of 20,000 miles per year per unit of equipment, the total costs, excluding any depreciation or return on investment in roadway and track, become as follows:

Double-truck car	47.87c. per car-mile
Safety car	29.90c. per car-mile
Double-deck bus	53.80c. per bus-mile
Single-deck bus	37.19c. per bus-mile

TABLE II—COMPARISON OF OPERATING COSTS PER MILE OF CAR AND BUS OPERATION

	Standard Double-Truck Car, Cents	Standard Safety Car, Cents	Double-Deck Bus, Cents	Single-Deck Bus, Cents
Direct Operating Costs:				
Maintenance of way and structures	2.50	2.00	0.50	0.50
Maintenance of equipment	4.25	3.00	12.00	10.00
Conducting transportation	19.00	10.00	17.10	9.00
Power (electric or gasoline)	4.50	3.00	6.00	4.00
General expenses	3.50	3.50	3.50	3.50
Total	33.75	21.50	39.10	27.00
Fixed Expenses and Charges:				
Taxes, depreciation and return on basis of 20,000 miles per year	14.12	8.40	14.70	10.19
Total	47.87	29.90	53.80	37.19
Total cost per revenue passenger	6.84	6.35	9.27	10.74

The results of these figures are shown in Table II.

Analysis of fixed charges is as seen in Table III.

From this study it appears that there is a differential between the double-truck car and the double-deck bus of 5.93 cents per mile of operation. The car-mile is not, however, an equitable unit of comparison, because of the difference in carrying capacity. Assuming an average of seven revenue passengers per car-mile for the double-truck car and a typical distribution of traffic between rush hours and non-rush hours a fleet of double-deck buses carrying the same traffic would average only 5.81 revenue passengers per bus-mile. On this basis the per passenger cost of the two types of equipment is 6.84 cents for the car and 9.27 cents for the bus, a difference of 2.43 cents in favor of the car. To make the bus operation more economical the density of traffic per mile of route operated must be such that the fixed charges on the permanent way required for rail operation will be more than 2.43 cents per passenger. If the cost of permanent way be taken as $50,000 per mile of single track and the fixed charges as 14.5 per cent, or $7,250 per year, the density of traffic need not exceed 300,000 revenue passengers per mile of

TABLE III—STATISTICAL DATA AND COMPARISON OF INVESTMENT AND FIXED CHARGES

	Standard Double-Truck Car	Standard Safety Car	Double-Deck Bus	Single-Deck Bus
Investment per Unit:				
Equipment	$10,000	$6,500	$7,000	$5,000
Power plant equipment	6,000	2,500	....	....
General equipment	5,000	3,400	4,200	2,500
Total	$21,000	$12,400	$11,200	$7,500
Fixed Charges per Year:				
Taxes, 2 per cent	$420	$248	$224	$150
Depreciation, 5 per cent on cars	500	325	....	....
25 per cent on buses	....	....	1,750	1,250
3 per cent on power plant	180	75		.
3 per cent on general equipment	150	102	126	75
Return, 7.5 per cent	1,575	930	840	563
Total	$2,825	$1,680	$2,940	$2,038
Fixed charges per mile of operation on basis of 20,000 miles per year	14.12c.	8.40c.	14.70c.	10.19c.
Average number of revenue passengers per mile of operation (Assuming normal urban distribution of traffic)	7.00	4.71	5.81	3.46
Seating capacity	52	32	51	24
Maximum capacity	100	60	70	40
Average speed, miles per hour	9	[illegible]	10	10

single track in order to make the rail service the more economical. Even with the cost of permanent way as high as $80,000 per mile of single track—approximately the present cost—the traffic density need be only 480,000 revenue passengers per mile of single track to offset the differential in operating costs. At the present time urban railway systems average from 650,000 to 900,000 revenue passengers per mile of single track.

Referring again to the direct operating costs plus fixed charges it will be seen that the one-man bus shows a per mile cost of 37.17 cents as compared with 47.87 cents for the double-truck car, the differential being in favor of the bus. If, however, these costs be reduced to a per passenger basis, as were those for the double-deck bus, the per passenger cost of this unit becomes 10.74 cents, or 3.90 cents more than for the double-truck car. Applying this on the fixed charges for permanent way at $80,000 per mile of single track, a traffic density of 300,000 revenue passengers per mile of single track would make the rail service more economical.

In the case of the single-deck, one-man bus seating twenty-four passengers and with a maximum capacity of forty, which is the unit referred to above, its application to traffic having typical rush-hour peaks would mean an increase in the number of units necessary during rush hours of 120 per cent over those required during the balance of the day, as was shown earlier in this discussion. If these units were used on a system or on a line where the increase required to handle rush-hour traffic were less than 120 per cent, the average number of revenue passengers per bus-mile would be increased and the average cost per passenger would be reduced.

With operating costs as they are at present, the motor bus cannot compete with the electric railway for mass transportation. The comparatively low initial investment of the motor bus makes it adaptable for service over routes where the traffic density will not support the additional investment necessary for rail service. As this traffic density increases each additional motor bus unit placed in operation adds to the total investment as much as the initial unit, and there is therefore no gain in economy in motor bus operation through a gain in traffic density as long as this requires the operation of additional units. With rail service, however, the operation of additional units requires only the capital outlay for cars, car storage facilities and power facilities, the original investment in track being available to handle the increased traffic. From these general observations and the analysis of operating costs set forth above it appears that it is economical to utilize the motor bus as a supplement to electric railways only under certain conditions of operation, which may be summarized as follows:

(a) For the operation of extensions to existing car lines or new lines in outlying districts where the traffic density will not run in excess of 1,000 revenue passengers per mile of single track per day and will therefore not be sufficient to support the necessary investment in permanent way, or where the distribution of traffic throughout the day is more nearly uniform. Even such operation may perhaps be economically abandoned if construction costs of permanent way recede from the present high level.

(b) For the operation of service over routes where the public will pay an increased fare for what it believes to be a special service and where therefore loading conditions can be somewhat controlled and the small over-normal capacity of the motor bus is not a handicap.

Financial Problems Confronting Utilities During Reconstruction Period*

By Henry E. Mendes
C. P. A., of the firm Touche, Niven & Company

Delicately Adjusted Position of the Utilities Has Made Them More Responsive to Financial Disturbance of the War—Some Accounting Problems Must Be Clarified, but Solution Lies Chiefly in Frank and Full Publicity and Efficient Economy

HENRY E. MENDES

THE history of every important war teaches that immediately thereafter a so-called period of reconstruction sets in, its length depending largely upon the extent of the conflict, the havoc wrought, both in lives and property, and the extent to which the morale of the population, generally, may have been affected through individual or personal losses, and also depending upon either the favorable or the unfavorable conclusion of the conflict.

It would seem that in this country the present period is very much like that which existed during the decade or so immediately following the Civil War, but greatly aggravated because of the vastness of the World War, and this despite the fact that the actual conflict, fortunately, did not reach our shores. A period of reconstruction is generally when certain businesses, wage earners and others derive extraordinary income or benefit in contrast to those who, unhappily, find themselves in the opposite condition, in which plight, it must be admitted, are to be found practically all public utilities comprising interurban, telephone, telegraph, gas, electric and water companies.

By reason of the supervision exercised by the commonwealth, public utilities, as such, are not in as favorable a position as most industries. Without the permission of either State or Federal commissions, they are unable, usually, to increase their revenue to conform to increased costs. Considerable time usually elapses, therefore, between the date of the application for an increase in rates or tariffs and the date that it is granted, if at all, and the increase, if granted, does not always come up to the expectations of the public utility as evidenced by its application, the decisions of the commissions being necessarily governed or dominated to a considerable degree by public sentiment, or in some cases even by political expediency. Unfortunately, public sentiment, as a rule, is biased, being molded largely through the opinions expressed in the press, which may either be based upon incomplete information regarding the pertinent facts or may be deliberately suppressed by it.

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*Abstract of address delivered before the annual convention of the American Electric Railway Accountants' Association, Atlantic City, N. J., Oct. 13, 1920.

In order to give proper and efficient service for any length of time, a public utility must be in a healthy financial condition. The question naturally arises, then, when is a public utility in a healthy financial condition? The answer would seem to be: When the utility receives reasonable or ample compensation for the services it renders; sufficient to pay the necessary operating expenses commensurate with the service demanded by the public, sufficient to pay for renewals and replacements of worn-out and obsolete equipment, sufficient to provide necessary funds for the purpose of extending its service along with the development of the community served, and lastly, though not the least important factor, sufficient to reasonably compensate capital for its investment and the consequent hazard undertaken. The notion seems to prevail quite generally nowadays that, because of the comparatively large capital investments in them, public utilities have unlimited and inexhaustible resources, to which the ordinary rule that income must at least balance expenditure does not apply, the public failing to realize that such a situation cannot exist and that, to use an old expression, "it is impossible to draw water from a stone."

To give adequate service in a growing community a public utility must interest new capital, thus enabling it to secure the additional facilities required for an extension of service. At the prevailing high rates of interest occasioned by the general financial situation the problem of interesting new capital is indeed a very serious one.

Strictly speaking, public utilities are not in a position to compete in a tight money market. The margin between their gross revenue and expenses is never sufficient to warrant paying what might appear to be exorbitant rates of interest, even if they were willing. Because of the regulations and attitude of the commissions, however, and in some instances, the restrictions placed upon them by statute, public utilities are not permitted to sell their securities at a discount, this term not only comprehending "discount" in its usually accepted meaning but including expenses incidental to the refinancing which proper accounting procedure would permit as a part of the cost of the new money.

SHORT TERM NOTES RECOMMENDED

Without necessarily desiring to lay down a fixed rule, under the present abnormal conditions it is probably the best theory for public utilities to issue short term notes at market rates, secured by long term treasury bonds at normal rates deposited as collateral for the short term notes. This is on the assumption, of course, that upon maturity of the short term notes conditions in the financial world will have adjusted themselves to a more normal basis, and it will then be possible to issue the long term bonds in substitution for the notes. In this connection, the fact should not be overlooked that in some instances refinancing may be prevented through the fact that other long term bonds already are outstanding, to which the new issue would necessarily be subordinated and would therefore have to bear a much higher rate than ordinarily rules for that class of security. This condition was one of the factors prevailing in some recent refinancings.

SERVICE-AT-COST ORDINANCES AND FRANCHISES

Consideration of this subject would not be complete without some reference to the so-called "service-at-cost" ordinances and franchises, which, so far, have only been applied effectively to electric street railways in several large cities—including Cleveland, Cincinnati, Youngstown, Rochester, Dallas and Montreal—although there is now agitation for the operation of gas and electric companies, and possibly other public utilities, on the same basis. In theory this is a commendable scheme, but the advantages to the community, on the one hand, and the proprietary interest, on the other hand, are frequently not as real as they may seem. The plan has a tendency to restrict service in some instances and, more particularly in a period during which abnormal conditions prevail, almost invariably prevents extension of property and improvement of service. The incentive to economy and efficiency is also to a very great extent removed by the guarantee of the return on the fixed capital investment of the company. Furthermore, a certain duplication of expense is almost inevitable under the plan, the ordinance usually providing for a traction commissioner with authority to organize a department of his own. To counteract the tendency to extravagance and to cultivate an incentive for economical management bonus systems are in effect in some cities in conjunction with the "service-at-cost" plan. It should also be noted that in some instances the communities affected have been known to object to a proper interest return, even on the reduced valuation placed on the property involved. Again, it should be noted that while the theory of the plan is good, it would seem that those who conceived and first advocated it were rather attempting to place themselves in a favorable light with the public, without regard to all of the essential elements; the result being that, in some "service-at-cost" franchises, no reference is made to such an important factor as depreciation, it being impossible, therefore, for the public utility to provide a fund for that purpose. Incidentally, the company is started out on an altogether unsound and erroneous basis, especially in relation to the public, which, once having formulated an idea, usually more or less hazy, regarding the provisions of the ordinance, can only adjust itself to the proper attitude with extreme difficulty, necessitating propaganda of an educational nature, which in certain communities the press is not willing to support.

Public utilities are not altogether blameless for the predicament in which they find themselves. They are largely responsible for a number of conditions that now give them embarrassment which, with a little foresight in the past, very easily could have been obviated. Perhaps the point most subject to criticism or, at any rate, the matter which has been responsible for the major part of the adverse criticism, is the overcapitalization and, it may be stated, the cumulative capitalization that unfortunately has prevailed in not a few instances, but which during later years has been prevented by the supervision of the commissions under the regulatory powers conferred upon them by statutes. Of course, some of the reorganizations and consolidations effected in the past were justified by the peculiar conditions prevailing in certain communities, and, while sometimes the apparent effect may have been to inject water into the undertaking, the actual result was to provide a more efficient and better co-ordinated organization, capable of expanding the service in direct relation to the increased demands of the community served. Subsequent benefits derived by the community, arising through these mergers, usually have justified them, as they not only tend toward economy in management, with consequent better service, but also make it possible to give more extended service. The objectionable features, by reason of the supervision exercised by the commissions, have been corrected and practically eliminated during recent years.

SOME ACCOUNTING SUGGESTIONS

Certain erroneous principles of accounting, as reflected on the books of some public utility companies, are also partly responsible for their predicament. These may be summarized briefly as follows:

(a) Not a few companies accrue taxes and other expenses that are of a recurring nature on anything but a scientific basis. It is asserted quite often that public utilities, because of their peculiar nature, should not accrue taxes and other similar items of expense in that which most industries and businesses find the most desirable procedure to follow in order to reflect proper operating results. The claim is made that taxes should only be accrued, if at all, in an amount sufficient to take care of actual cash disbursements that must be made for taxes during a given period as and when they fall due. From an accounting standpoint such a procedure is indefensible, and as a practical proposition its merit can be questioned quite seriously. Proper accounting, whether it be either for an industrial organization or for public utility, demands that taxes be accrued for the period covering which they are payable in relation to the expenditures of the state, or municipality, as evidenced by information usually shown on the tax bills, and if not so shown by information that always can be obtained from the tax officials, and not necessarily for the period to the last date by which the taxes must be paid in order to obviate the assessment of fines or penalties. This seems to be so obvious as to require no further argument.

(b) Depreciation also seems to be quite a bone of contention, the amount provided for this item on the books of some public utilities being dependent, in a great measure, on how much tariff the gross income can stand. The manner in which reserve accounts for depreciation are handled quite often indicates that the first principles of good accounting theory and practice are ignored altogether. A reserve account, as such, is only an account established for the purpose of equalizing the expense or loss entailed through the gradual wearing away, or passing out of existence of property, by reason of its use or otherwise, so that when it eventually becomes necessary to replace the property, the entire charge will not be made to the operations of the period in which the replacement is made, or possibly capitalized, but may instead be borne by the reserve account. Properly to create a reserve for depreciation it is necessary to credit currently to the reserve account definite amounts, calculated on the basis of rates of depreciation developed as the result of experience, by corresponding reductions of the gross earnings derived from operations. Any other treatment of a reserve account, such, for instance, as crediting to it arbitrary amounts at irregular intervals, serves no useful purpose whatsoever and might as well be abandoned. From a financial point of view, of course, the stockholder and investor is interested in seeing, and is entitled to know, that adequate reserves are being made by a public utility in arriving at the results from operations shown in its published statements. It should be emphasized, furthermore, that a reserve account of itself does not provide the funds necessary for replacements and obsolescence. A proper program to insure that any business will be uniformly successful over a period of years where the investment in plant is a vital and important factor contemplates the laying aside, or earmarking, of specific funds or investments for the purposes stated. Any amount of bookkeeping would not provide the funds necessary to achieve the desired result as they can only be derived from the usual sources.

(c) Another questionable practice adopted by some public utilities, which is related very closely to the foregoing, is to write off over a term of years the capital investment in wornout, old or obsolete equipment, after its replacement by new equipment, instead of, in the first instance, having written off the equipment over the period during which it was used, and providing a reserve for depreciation covering the new equipment, on the basis of recognized rates of depreciation, over the term of its probable life. Such practice merely tends to put off the evil day when an accounting eventually must be made, but, aside from a miracle, does not prevent it. Many public utilities, finding themselves in the predicament of having exhausted important units of their plant investment without having made due provision for their replacement, as explained, are confronted today with this situation.

(d) A further inconsistency that seems to prevail more or less generally is that of including allowances for depreciation in arriving at the basis for establishing rates and then, on the other hand, objecting to the reduction of the plant or investment account for the determination of capital values for the same purpose or of invested capital for Federal tax purposes and, occasionally, also for the purposes of the published financial statements.

Concerning the foregoing fallacies, no sound reasons can be advanced for handling the accounts of public utilities in any other manner than on the basis recognized by proper accounting procedure developed as the result of the experience gained in other sound businesses and representative industries. Public accountants are often confronted with the argument that certain features, by reason of conditions peculiar to a business under examination, must be considered from a different angle than that from which similar items may be treated in other unrelated businesses. While, admittedly, differences do occur which require special treatment, the matters set forth above are fundamental, and should apply to all businesses, not even excepting public utilities.

To conclude, then, the principal financial problems which must be solved by public utilities during the so-called period of reconstruction through which we are now passing may be considered to arise, on the one hand, from the abnormally high interest rates which preclude the possibility of obtaining funds for development or of refinancing maturing obligations on anything short of the most ruinous terms; from the urgent necessity which exists for the carrying out of long deferred improvements and from the excessively high cost of new construction and equipment; and, on the other hand, from the shrinking margin between operating revenue and expenses, due to increasing costs and the indifference of the public to the vital need for adequate increases in rates. The remedy appears largely to lie in the presentation of facts and figures to the public and to the public service commissions, stated upon the soundest basis and with the utmost measure of frankness; in the education of the public to the justice of the claims of the public utilities and to a realization of the truth that efficient service cannot be rendered for any length of time without adequate compensation to capital and, lastly, in the practical exemplification of the truth that a penny saved is a penny earned, by a continuance of the measures tending toward rigid economy.

The Motor Bus in Urban Transportation[*]

By George J. Shave[†] and Frank C. Pick[‡]
London General Omnibus Company, Ltd.

The Superiority of the Motor Bus for Light Continuous Traffic Is Shown, the Tramway Being Economical for Heavy Continuous and Peak-Load Traffic

THE WRITERS of this paper are engaged in the management of motor omnibus services in Greater London. Their position is unique in that London, unlike any other metropolitan city in the world, has depended, and still depends, upon the omnibus for a large proportion of its passenger movement. In the year 1920, that is now closing, it is estimated that the underground railways will have carried 675,000,000 passengers, the suburban steam and electric railways 350,000,000, the tramways or street railways 1,100,000,000 and the motor omnibuses 1,035,000,000, so that each instrument of transport: railway, tramway and motor omnibus, will have approximately a third share in the total movement.

The motor omnibus is the successor of the horse omnibus, and the horse omnibus occupied in the past those streets in London which are now traversed by electric tramways. The tramway is the usurper. The mileage of streets and roads in Greater London occupied by electric tramways is 348. The mileage of streets and roads still occupied by motor omnibuses is 577, of which 222 miles are over the tracks of the tramways.

The problem of the relationships between tramways or street railways on the one hand and motor omnibus routes on the other is thus a peculiar problem in London. This paper makes no profession of dealing with it, although many of the facts given in the paper are necessarily drawn from London experience. Last year the writers had the pleasure and advantage of visiting the United States of America and seeing some of the important systems of street railways which now serve the great cities of that country, and they have endeavored to keep in mind the fact of the existence of the street railway as the predominant factor in urban development in expressing the views which follow.

A HISTORICAL NOTE

It must be admitted that the motor omnibus is a late comer into the field of urban transportation and has therefore provoked controversy. Every controversy has a historical background, and so it is in this case.

The origin of things always seems to be involved in obscurity, even though the origin is quite recent. It is therefore difficult to be certain of the truth of what is next stated. When was the first electric railway built? The answer would seem to be in 1881 at Lichtenfeld, near Berlin. The first tramway or street railway would seem to date back to 1883, several places in Great Britain competing for the priority being almost contemporaneous. In the United States, Cleveland (Ohio) apparently enjoys priority with a short section built in 1884. Whatever the settlement of this jealous dispute, the fact remains that the street railway is not very old, but yet much older than the motor omnibus. For the first motor omnibus in public service occurred in London in 1897. It was experimental only and from that date to 1902 remained in an experimental state; 1904 is the first year of effective motor omnibus operation. The motor omnibus then advanced a little more each year until by 1911 it had entirely supplanted its predecessor the horse omnibus. London is distinguished in being the pioneer of the motor omnibus in public service.

Between the introduction of the street railway and the perfection of the motor omnibus for public service there is a gap of about twenty-five years. These years were crowded with every sort of improvement and development of street railways, especially in America, so that by the time the motor omnibus was in a position to become a competitor the street railway had established itself as the one generally accepted means of dealing with urban passenger transport. By that time there would be, at a guess, over 35,000 track-miles of street railway in the United States, built at a cost of some $3,600,000,000, and carrying 9,000,000,000 passengers in the year.

Further, it is of especial interest to observe that the underground and elevated railways of American cities were not a new departure in urban transport, the intrusion of a new factor, so much as a progressive specialization of the street railway, the provision of the street railway not on the surface of the street but above or below the street proper, running over its own right of way to avoid delay and reduce congestion. Similarly, the interurban railways, which correspond closely to the branch lines of our English main line railways, are merely an extension or adaptation over the country of the urban street railway. And this is a continuing process. The motor omnibus comes in to disturb a situation which is primarily based upon the street railway as the one dominant factor.

Unlike London, therefore, the motor omnibus in America finds a large portion of its prospective field occupied by a well organized and established rival, and this historical accident accounts largely for the controversy which is now being waged.

THE STREET CAR AND MOTOR OMNIBUS COMPARED

In any discussion of the relative merits and capacities of the street railway and the motor omnibus route, it is first of all important to compare the vehicles employed as instruments of transport. The principal factors in such a comparison are four: Speed of operation, road occupation, convenience and flexibility of operation, and passenger accommodation.

In London the authorized maximum speed of a motor omnibus under the regulations governing its use on the streets is 12 m.p.h. This is generally agreed to be too low a speed and there could be little opposition to its increase to 18 m.p.h. It is hoped soon to effect this amendment. The average speed in actual operation under urban conditions of traffic is about 10 m.p.h. This allows for an average of three or four stops to the mile. The practice has not hitherto been to mark out fixed stops for the motor omnibuses but to require the vehicles to stop to pick up and set down as required by the traffic. Recently a scheme of fixed stops has been adopted experimentally on certain routes. The stops are carefully surveyed to cover traffic holdups which are not included above, and average four compulsory and two optional stops to the mile. This alteration has been instrumental in slightly raising the average speed of operation.

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[*] Abstract of address before American Electric Railway Association, Atlantic City, N. J., Oct. 14, 1920.
[†] Manager of maintenance.
[‡] Commercial manager.

In London the tramways have maximum authorized speeds ranging from 6 to 16 m.p.h., according to varying physical conditions governing the track, such as gradients, curves, width of streets, and so forth, the normal speed being 12 m.p.h., as for omnibuses. Again this is thought to be too low for modern improved conditions, and it is expected that it will be raised to a figure comparable with that for the motor omnibus given above. The actual average speed of operation under urban conditions of traffic is about 9 m.p.h., which covers an average of five stops to the mile. These stops are fixed and marked and are of two kinds, compulsory and optional. There are on the average nine to ten to the mile of track and actual stops are made at 50 per cent of them. The too great frequency of the stops, even looked at from the point of view of reasonable public convenience, is a determining cause in the relatively less efficient speed of the tramcar compared with the motor omnibus. There will, however, always be a slight gain of speed in favor of the motor omnibus because of its quicker stopping and starting. And there will always be a factor operating in favor of the motor omnibus in that the tramway speed is necessarily that of the slowest, most labored car.

Turning to New York, the figures given to us as the average working speed of street cars in Manhattan was 7 m.p.h. (while the maximum speed was only 9), and of the motor omnibuses in Fifth Avenue 8.5 m.p.h. The same feature would, therefore, seem to be present, but at a lower general level of speed, which is a curious trait. In the other cities of which we have data there is improvement. Detroit showed an average speed of 10 m.p.h. and Cleveland of 11 m.p.h. This improvement we ascertained was wholly due to a judicial revision of stops and a limitation in the number of them. In Broadway, New York, the stops have mounted to nearly fifteen to the mile, a usual number was twelve, but the desired number was not more than eight. Stops are the real determinant of speed, and the larger the vehicle the longer the stop, because the greater the load. This must be borne in memory in connection with the accommodation afforded by street car and motor omnibus, to be discussed later.

Having regard to the fact that the street railway or tramway usually occupied the center of the road allotted to fast-moving traffic there is every reason why it should operate at a relatively high speed, because it will then be less obstructive to other fast-moving traffic in that position. This and the danger to passengers boarding and alighting in the center of the road would seem to dictate a policy of few and well-regulated stops as the right one.

Road occupation is a function of the speed of operation, and the size of the vehicle. There has always been bitter argument as to whether a motor omnibus or a street car occupies the roadway to the greater extent and so contributes in the greater degree to cause congestion. In London there is fortunately the testimony of the London Traffic Branch of the Board of Trade. In its report for the year 1914 it says:

> The extent of occupation of the carriageway, both in regard to time and space, and the physical obstacle that each moving vehicle presents to other users of the road, considered in conjunction with the nature of its movements, are the main points that have to be taken into account in arriving at the coefficient of obstruction for each class of vehicle, quite apart from the actual work done by the vehicle, whether it be the quantity of goods conveyed or the number of passengers carried. Such matters as the general convenience that a public conveyance may afford, or the freedom from accident that it may enjoy, do not directly affect the point under consideration, however important a bearing they may have on the problem generally.
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> It was hoped that the publication of a scale of units in 1910 would evoke some discussion of this matter, but it attracted very little attention, and for want of any better suggestion, the original scale has been adhered to hitherto in the census calculations. A certain amount of criticism, however, has more recently been disclosed, and in the light of the further four years' experience, it is recognized that some modification of the scale might make these figures compare more satisfactorily. The very large increase in the number of motor omnibuses in service has brought more prominently to notice the inconvenience and delay to other traffic caused by their drawing-in toward the pavement and stopping at intervals, and it is now realized that sufficient importance was not attributed to this movement originally. The development of the commercial motor and the introduction of the motor parcel car also entail some adjustment of the classification, and of the values allotted to these vehicles.

A resurvey of the table was therefore undertaken with a view to arriving at some more authoritative figures that will insure sound comparison in the future, and after obtaining many well qualified opinions, the following revised scale has been decided on, and the census returns of previous years have been recalculated accordingly:

Passenger Vehicles			Trade Vehicles		
Electric tram		9	One horse	Fast	3
Omnibus	Horse	5		Slow	7
	Motor	4	Two horse	Fast	4
Cabs	Horse	2		Slow	10
	Motor	1	Light motor, fast		1
Carriages	Horse	2	Heavy motor	Fast	3
	Motor	1		Slow	5
			Barrows		4
			Cycles		½

With the increase in the seating capacity of the motor omnibus first to forty-six and then to fifty-seven, which is now taking place in London, there can really be no question at all left that as a cause of congestion the motor omnibus is a smaller contributor than a tramcar. The importance of this factor is, however, reduced where roads, as in America, are so wide that there is no congestion. Where there is room for all and to spare it cannot matter.

CONVENIENCE AND FLEXIBILITY OF OPERATION

This factor is almost a corollary of the preceding one, that of road occupation, but it opens up two or three fresh observations.

The motor omnibus can accommodate itself to the other vehicular traffic of the road. It can pull out to the middle when its speed is good and fall in with the quick-moving traffic. It can pull into the side when its speed is poor or when it is picking up or setting down and so fall in with the slow-moving traffic. It also by this facility of movement directly contributes to the safety of the passenger by keeping him always on the footwalk and obviates the creation of islands or safety zones, which occupy part of the available road space and often prove seriously obstructive.

Again, there is no limit to the extent to which passenger traffic can be dispersed by the use of motor omnibuses. Unlike street cars, they are not confined to expensive tracks or dependent upon continuous connection with a source of power. This permits of the routes and services being taken much more nearly to the actual points at which passengers arise in the residential districts or to which they proceed in the commercial districts, and vice versa. This is a great gain. It is a gain in convenience to the passenger. It is also a gain in street capacity, for a wide dispersal, whether of passenger or vehicular traffic, avoids congestion at particular points. Parallel roads may readily be worked in relief of each other. The services in an arterial road may branch out into secondary roads on either side at intervals, helping to reduce the pressure on space in the roadway.

This reminds us of the striking difference which exists between the layout of the system of routes of street cars in an American city and the layout of the system of motor omnibus routes in London. In an American city the routes are few and direct to some central point or diametrically across some central point. Passengers not desiring to make rides on this direct route are given transfer tickets to change onto another car to reach the destination required, which is not on the line of route of the original car. In London, on the other hand, routes are many and are interlaced so that in a given main radial there may be service proceeding to five or six different destinations by different routes, in fact to all destinations for which there is an appreciable traffic. This wide choice of rides removes the need for any transfer or exchange ticket, and when such tickets have been tried in London they have never been taken up and used in any numbers worth recording. The tramways of London copy as far as possible the motor omnibus routes in their complexity, but the delays at junction points of tramway tracks are a deterrent obstacle to the practice. The motor omnibus lends itself to such a layout of routes much more easily than the tramcar.

Against the merits of dispersal and flexibility is to be set the cost of maintaining many more roads suitable for heavy motor car traffic. It is only fair to note this, although main roads and first class roads, and even secondary roads in metropolitan cities, must under modern conditions always be made up to this expensive standard quite apart from the running of motor omnibuses over them.

PASSENGER ACCOMMODATION

While, therefore, the motor omnibus must be held to have the advantage of the tramcar or street car under the three factors already discussed, still a factor remains which somewhat adjusts the balance in favor of the street car, and that is the passenger accommodation.

In London up to the year 1919 the standard double-decked motor omnibus seated only thirty-four (sixteen inside and eighteen outside), while the standard double-decked tramcar seated seventy-eight (thirty-two inside and forty-six in a covered upper deck). This was a heavy handicap. With the rise in the costs of operation consequent on the war the smaller capacity of the omnibus restricted earnings and became uneconomical.

Prior to the war, in spite of the difference in size, the earning capacity per mile run of both vehicles had been approximately equal. With the war and the growth of the volume of traffic occasioned by it the tramcar drew ahead of the motor omnibus, and the problem of enlarging the motor omnibus became acute. Fortunately progress in design since 1906, when the pre-war type of omnibus had been last settled, made enlargement an easy matter. Early in 1920 a 46-seat omnibus (twenty-two inside and twenty-four outside) was built and proved successful. The comparison of the old and the new vehicles with the regulations establishing the standard approved by the police is briefly outlined in the following figures:

Item	Police Regulations	Pre-War or B Type	Post-War or K Type
Length	Not to exceed 23 ft.	22 ft. 6½ in.	22 ft. 7⅜ in.
Height	12 ft. 6 in.	12 ft. 7 in.	12 ft. 2 in.
Width	Not to exceed 7 ft. 2 in.	6 ft. 11½ in.	7 ft. 1½ in.
Wheelbase	Not to exceed 14 ft. 6 in.	12 ft. 10⅜ in.	14 ft. 2¼ in.
Overhang over back axle	7 ft. 6 in.	7 ft. 7⅛ in.	6 ft. 7¾ in.
Weight* unladen	Not to exceed 3 tons 10 cwt.	3 tons 12 cwt.	3 tons 9 cwt.
Weight laden	Not to exceed 6 tons	6 tons	6 tons 13 cwt.

The police have permitted variations in the weights.

It may be observed: (a) That the increased load was obtained without any increase in the over-all dimensions permitted; (b) that with a lengthened wheelbase and improved springing the additional weight meant less and not more road shock; (c) that the general safety of the vehicle when fully laden has been improved by lowering the floor of the vehicle from 35 in. above the road surface to only 29 in. above the road surface, and consequently the center of gravity is lower too.

Once a new departure in design was initiated development was speedy. The 46-seat omnibus was not final. Experience with its operation almost instantly revealed the possibility of something still more commodius, and a 57-seat omnibus has been built experimentally. This too proved successful and 250 of the type are now under manufacture. The handicap of the motor omnibus has therefore been appreciably reduced. The principal tramway authority in London is so much moved by the success of the new omnibus that it is seeking from Parliament powers to run omnibuses itself, and has offered a prize of £1,000 for a design of a new tramcar.

Reverting to the other side of the account, the street car scores by its ability to draw a trailer. This doubles the seating capacity of a traffic unit and might be a conclusive advantage if it were not that a track cannot carry as many double units as it can single units under actual working conditions. There is talk of a motor omnibus trailer, but up to the present this is idle.

A standing load is not at this time permitted in London, the concessions of the war period being withdrawn. The policy that resists a standing load is open to question, especially when the large number of short riders on street vehicles and the popularity of the open crush spaces on French and German street cars and motor omnibuses is considered. America enjoys exactly the reverse policy, for the writers discovered that even the various traffic commissioners expected in the rush hours some fair percentage (50 to 75 per cent) of the load carried to be standing. This introduces a new element into the discussion of passenger accommodation in America.

The street car of the usual type seats fifty to sixty passengers, and easily accommodates as many more standing. The motor omnibus of the predominant type now in use seats forty-two to forty-four, but accommodates at the most eight or ten others. Motor omnibuses to seat up to sixty are projected, but, so far as the writers are aware, are not in effective operation.

The handicap of the motor omnibus therefore persists under American conditions, and there can be no question that accommodation afforded must tend to become the crucial test of efficiency in street transportation with the growing congestion of the streets of the great cities.

COST OF OPERATION

Although not quite in the same category as the four foregoing factors, the factor of comparative cost of operation still remains to be reviewed. The cost per car-mile of operating an electric street railway in London is slightly more than the cost of a motor-omnibus-mile. The difference is negligible. This is what might be expected, for both vehicles have a driver and a conductor, and need garaging and repairs. The principal chance of divergence must rest in the cost of fuel, electricity based on coal and petrol based on oil. The danger to the motor omnibus industry seems to center in the fuel problem. The world stocks of oil seem less than the world stocks of coal. There is a time, calculated to be not very far off, when the oil will be exhausted. Fortunately the use of petrol substitutes throws open a door to a wider future. Before the crisis comes benzol or power alcohol may have achieved commercial success. Therefore there is no reason to fear that there will ever be a marked divergence in the costs of the two methods of transport.

On the other hand, the capital cost of tramways far exceeds the capital cost of providing motor-omnibus routes (the ratio is over three to one) and unless this capital cost can be spread over a dense service it becomes a burdensome charge per car-mile, and definitely places the tramcar in a worse position. It is estimated that, to enable competition by these two instruments of transport to be conducted on approximately equal terms as to cost per car-mile, the street-car service must amount to not less than an average of twenty-five in the hour throughout the day in each direction. Then some one will remark that the competition is not to be measured in car-miles, but in passenger-place-miles, and so the load factor comes in as a corrective. As it varies from city to city with the conditions and circumstances of the traffic, argument about it is fruitless. In London the average passenger load per omnibus-mile was last year twenty-seven for the 34-seat vehicle against thirty-one per tramcar-mile for the 78-seat vehicle.

THE PASSENGER MOVEMENT OF THE STREETS

It is not expedient to weigh up the case for and against the motor omnibus as it has been developed so far, for there is an entirely new aspect to be opened up. Even if a conclusion could be reached in the comparison of the two vehicles, the street car and the motor omnibus, still the problem to be solved is hardly fully stated. What do these two vehicles aim at accomplishing? What is the passenger movement of the streets to which they are to be applied? What is the traffic problem to be tackled? It is impossible here to answer these queries in full and a brief examination under two heads must suffice, namely, street capacity and passenger density.

One reason why London has remained a motor omnibus city is the narrowness of its main streets, and the irregularity of its planning. To provide double-track tramways in the main arterial roads has not been possible, and the tramway tracks in some of the roads even now contain lengths of single track, or double tracks with interlaced lines. This happens because of what may be termed a general requirement of all tramways in England, a clear space between the outer rail and the curb of not less than 9 ft. 6 in. Yet this 9 ft. 6 in. barely allows for one line of traffic either side of the tramway, and is obviously inadequate to make proper provision for the other vehicular traffic in such a street. One would have thought that an arterial road of a city carrying a tramway would have been of a width sufficient for the movement of three lines of traffic in each direction, of which the two center lines would have mainly consisted of street cars. London is a shameful way behind such a standard. London has tramways which ought never to have been constructed as they are.

This narrowness of the streets and the pressure of other forms of vehicular traffic on the tramway tracks react on the capacity of these tracks themselves. Under favorable conditions the maximum number of cars passing in one direction across a point in a continuous running track is only about sixty-five in the hour with trailers attached, or eighty without trailers. This falls short of the results obtained in America, but there the wideness of the streets tends to insure continuous free passage to the street cars. The fact of roads being wide and generously laid out invites and justifies the building of street car tracks. It is this entire change in the aspect of the streets which makes the new American cities tend to street railways while the ancient European cities tend to motor omnibuses.

Perhaps it may serve to impress this difference on the mind if the widths of a few principal London streets are recorded. The Strand, which is a main east and west channel of traffic, is in places only 32 ft. wide in the carriageway. It is now being slowly widened throughout to give a carriageway of 60 ft. This street carries motor-omnibus services mounting to 170 vehicles in the hour in each direction in its present unsatisfactory state. Oxford Street, the other main east and west channel of traffic, is 52 ft. wide in the carriageway, and it carries motor-omnibus services mounting to 199 vehicles in the hour in each direction, and carried prior to the war as many as 246. [The best result for an American street track that we can quote for comparison is 120 in one direction in the hour.] When the other vehicular traffic of these streets is considered, the above results are emphatic testimony to the flexibility of the motor omnibus and its adaptability to streets of such a character. The maximum-motor omnibus movement in any street in London at the present time is only 216 vehicles per hour in each direction. This occurs in Whitehall. The physical characteristics of the streets and roads used must govern the choice of the instrument of transport to a large extent.

PASSENGER DENSITY

The second head is the volume of passengers offering for transport, and this must be looked at not only as a total number offering in a given time, such as a day, month or year, but as a volume unevenly distributed over the given time. After all, whatever instrument of transport is chosen it must be capable of dealing with the passengers when the movement is at a peak. Here again, while some features are common to all cities, the range in density from the slack hour to the rush hour varies much. Observation in London, however, shows one curious feature. The motor omnibus is more successful than the tramcar in attracting passengers during the slack hour, and experience, therefore, a less disparity in its loadings throughout the day. It creates a traffic which cannot be secured by a tramcar because it enjoys a greater esteem or a higher prestige. In New York the same feature is observed, only there the higher fare helps to accentuate the distinction. It is more fashionable to pay the higher fare.

It is possible to frame an ascending scale of densities of traffic, and to note the limits in the scale which mark the service capacity of different instruments of transport. Such a rough scale prepared for London would be as follows:

Description of Traffic	
Very light	Under 500,000 passengers per mile of route per annum
Light	From 500,000 up to 1,000,000
Medium	From 1,000,000 up to 4,000,000
Heavy	From 4,000,000 up to 6,000,000
Very heavy	Over 6,000,000 passengers per mile of route per annum

Then, calculating the maximum possible carrying capacity of the flow of motor omnibuses or tramcars through the streets or of trains on a railway and the minimum possible load for each class of service which would be economical we can decide as follows:

Very light passenger traffic can only be economically carried by motor omnibus.

Light passenger traffic is best carried by motor omnibus, but can also be economically carried by street car.

Medium passenger traffic can be carried by motor omnibus, street car or railway train.

Heavy passenger traffic can only be carried by street car or railway train.

Very heavy passenger traffic can only be carried by railway train.

Such a scale may be applicable to American conditions without change, but probably the maximum limits for medium and heavy traffics are slightly higher.

Another method of analysis is interesting. The local passenger movement of a metropolitan city is of three types, convergent, incidental and dispersed. Convergent traffic flows inward and outward on the main radial routes chiefly between homes and workplaces. Its characteristics are, first, that it flows irregularly in peaks and shallows, following the customary divisions of the working day; second, that it covers moderate and long distances. Tramways or railways are the most suitable means for its conveyance. Incidental traffic is traffic arising in and around the various centers of activity both main and subsidiary. Its characteristics are, first, that it flows evenly throughout the day; second, that it covers short distances. Motor omnibus routes or tramways are the most suitable means for its conveyance. Dispersed traffic is traffic moving transversely or otherwise eccentrically in the area. The characteristics of this traffic are ill-defined, but generally it covers moderate or long distances. It is usually a light traffic and comprises a large element of pleasure riding. Motor-omnibus routes or railways are the most suitable means of transport employed. Convergent or incidental traffics are medium to heavy. It is estimated that in London 40 per cent of the total movement is convergent, 40 per cent incidental and 20 per cent dispersed.

This analytical method of approach is not suggested to lead to accuracy of diagnosis, but it helps to clear up the judgment of those who must prescribe for the traffic problem.

Having set out briefly the pertinent factors that must determine the judgment, it only remains to indicate the conclusions which can fairly be drawn from them. When is a motor-omnibus route the correct solution of a street traffic problem?

But before commencing to give an answer it is necessary to ask another question. Is there a street railway? If there is a street railway then two new questions come into view. Is the street railway capable of dealing satisfactorily with the problem? What new service can the motor-omnibus route afford?

COMPETITION JUSTIFIED

Clearly, where the street-car service at its maximum of efficiency is unable to deal with the traffic wanting to be carried at the time of maximum movement, it is only right to supplement it by a motor-omnibus service. This decision only presents new complications, for when the point of maximum movement is over, there is an excess of service and the task is to decide which of the competitors shall give way. There is no doubt that the motor omnibus is adapted to the convenient handling of all passenger traffic up to a density of 5,000 riders per hour in each direction (4,000,000 passengers per mile of route per annum). Hence the slack hours can usually be covered by motor-omnibus routes, leaving to the street cars the duty of coming in to relieve the heavy stream of the rush hours. The fact of the street car having the larger accommodation is only another index of the rightness of this. It is a peak-load vehicle. But then there is the capital sunk in track and overhead equipment, power plant and so forth, standing idle for the greater part of the day, so that questions of efficiency in operation must be qualified by financial considerations. Up to the limit indicated it becomes a question of expediency.

Clearly again, where the street-car service pursues a direct and single route and there is a reasonable volume of passengers desiring to diverge at some point on this route to destinations on either side, motor omnibus routes passing over the street-railway tracks and spreading out to suit the public requirements are justified as a public facility. Such routes develop and cater for new traffic.

Clearly again, where a motor-omnibus route proceeds over a street railway and advances beyond it it is affording a new facility which justifies it. The overlap of the motor-omnibus route onto the street railway should, however, not exceed such reasonable length of between one and two miles as will give a continuous ride to short distance passengers crossing over what would otherwise be the point of break in service.

There is not an instance in London where an omnibus route immediately parallels a tramway that is not justified under one or other of the above propositions, nor is there a single instance where the tramcar and the motor omnibus perform exactly the same service. Upon this it is pertinent to note that where a tramway route and motor-omnibus route work in parallel over a considerable distance it may be desirable that the service each provides should be differentiated. For example, by eliminating stops on the tramway the effective speed of the service may be increased and it becomes non-stop, or semi-express, and so affords improved facilities for moderate or long-distance traffic, while the motor omnibus service steps into its place to deal with the short-distance casual traffic. With the tramway in the center of the roadway, as already shown, the speeding up would be a natural development. This is merely a suggestion; no such step in co-ordination has been attempted in London, but it would seem worth trial.

Competition, as competition merely, in transport service cannot be justified where there is public regulation or control. The best service can be given under such circumstances by co-operation. In American cities with their elaborate transport commissions, therefore, there is always an independent body able to weigh up the merits and capacities of the various instruments of transport as roughly outlined in this paper and give a judicial and equitable decision. There can be no excuse for what is known as jitney competition. In London, where there is no such control organization in existence, and where the municipal authorities own part and private companies other part of the transport facilities, there is necessarily room for conflict, but even then commercial considerations always tend to secure adjustments of view and efforts at co-ordination. There is an inevitable tendency toward it, just as there must be an inevitable tendency for motor-omnibus routes to be conducted under conditions no less ordered than street-car routes, and carrying with them privileges no less great. In London the streets are open to all competitors. Any one obtaining a license from the police authorities may run a motor omnibus. This is false freedom, and as the control of motor-omnibus traffic is extended, it makes the situation unfair. The aim that is to be sought is a franchise with its essential concomitant public control, with co-ordination of all transport services in the best interests of the passengers and the undertakings.

THE PLACE OF THE MOTOR OMNIBUS

This is by the way, but sufficient has been said to indicate that where there is a tramway many considerations must enter into the judgment of the right use and employment of motor omnibuses other than those depending on the relative transport efficiency of these vehicles compared with street cars. On the contrary, where there is no tramway the judgment is clearly dependent on no other factors. It remains, therefore, briefly to summarize them once more.

For any traffic movement which does not exceed 5,000 passengers in any one hour in one direction the motor omnibus is the capable and efficient instrument on any ordinary street. On a wide street it is efficient and capable of handling a movement mounting to 8,500 passengers in any one hour in one direction, while for any traffic movement below 1,000 passengers in one direction *on the average* of every hour of the day the tramcar is uneconomical, or rather the motor omnibus can perform the work more cheaply. Therefore, for traffic up to an average throughout the day of 1,000 in the hour, which will most likely correspond to a maximum movement of 3,000 in the rush hour in one direction, the motor omnibus is the best practical solution, and between 3,000 and 5,000 both tramcar and motor bus are capable, with a preference in favor of the motor bus, and between 5,000 and 8,500 both are still capable, but now with a preference in favor of the tramcar. Over 8,500 up to 12,000 the tramcar is capable, after which a new means of transport must be introduced.

This means that for traffic on lightly or moderately loaded roads motor omnibuses should be used. This is the case on all cross-country routes, on cross-connecting roads, on extensions into the outskirts of cities. These are naturally motor-omnibus routes. Subject to a concluding caution set out later, main radial city routes are street railway routes, and as already indicated some of these call for both street railway and motor-omnibus routes.

As stated above the problem looks simple as A B C (even if the figures given are disputed). Every one can calculate the maximum possible movement of passengers with a vehicle of a given size and frequency, and every one can calculate at what point in density of service the capital cost per car-mile run on a street-railway system equates down to the capital cost per car-mile run of a motor-omnibus system. At a certain density this occurs and then the street car becomes an economic possibility. But alas, the traffic problem of any city is never stationary. Traffics come into being and disappear. They shift from place to place with shifts in trade, growth in populated areas, changes in neighborhood brought about by political and social influences. A city is always becoming a more and more specialized aggregation of people. There is a university quarter, a trade quarter, a theater quarter, a shopping quarter and so forth, and each quarter has its traffic idiosyncracies. How meet all this? Here is the great economical advantage of the motor-omnibus route; it can follow the traffic. Its garages can serve many streets and in its garages alone is it fixed to any spot. It can test changes in flow of traffic. It can seek out and create traffics. It need never be left desolate when its traffic has disappeared.

But more important than the shift and change of the traffic is the constant increase in the total volume which takes place year after year in all healthy progressive cities. Population drifts everlastingly into vast aggregations. London, with its 8,000,000 people, is a monstrous growth and still it goes on. Therefore, the rate of flow of traffic today is not the rate of flow of traffic tomorrow. There is no fixed measure by which to decide in favor of street car or motor omnibus. And here a new instrument of transport forces itself upon the attention. There is a limit to the capacity of the street car. Over 12,000 passengers in the hour in one direction means the breakdown of the service, after making liberal allowance all the while for strap-hangers. Then the underground or elevated railway, the specialized street with the specialized transport must appear. Once again there is a minimum limit. These railways are expensive to construct and probably a density of less on the average than 2,500 passengers per hour each way at any point would be uneconomical, but the maximum is advanced to much higher figures. Ten-car trains, each accommodating ninety passengers seated and as many more standing, running on a close headway giving thirty-six to the hour in one direction, multiply up to a grand total movement of 64,800 passengers.

All a reasonable man can do is to look ahead, and estimate as he is best able what the traffic requirements will be and provide accordingly. But he will use the motor omnibus whenever he can, because the risk of loss is much less an account of its transferability. He will not build a street railway when he knows that soon he will want an elevated or underground railway, for with an underground or elevated railway to handle the peak traffic and the long-distance traffic he will find the motor omnibus to be a sufficient auxiliary in the street above to deal with the casual short-distance traffic. This is the situation in large sections of London, and it is eminently satisfactory. This explains why London cannot ever be a tramway city. The tram has gone by, the phase is past. It may be a lesson for America, but who are we to say that?

The Motor Vehicle—Competitor or Ally?*

By George M. Graham
Vice-President Pierce-Arrow Motor Car Company

The Author Advocates the Operation of Auxiliary Bus Services by Electric Railways, but Expresses the Conviction That the Motor Truck Furnishes the Best Means of Giving Short-Haul "L. c. l." Freight Service

IN EXAMINING the big question of whether the motor vehicle can compete with the electric trolley car, can supplant it or can economically and profitably supplement it, there is difficulty in finding a specific "Yes" or "No." As in most things in life, no decision can be absolute. The trolleys are neither all good nor all bad, and motor buses come within the same category. The task is to find a place for both.

No motor-vehicle manufacturer has ever said that electric trolleys could everywhere be supplanted by motor vehicles. The statistics of passenger traffic on electric railways prove the essentiality of its service. We should not permit the trolley to be dealt with unjustly. The price the country paid for a narrow steam railway policy is a disastrous reality. We have corrected that injustice; we should not repeat the error with electric railways.

Nor should the electric railways be sacrified to the uncontrolled jitney bus. The trolley company has a responsibility to the entire community. It must be run or its franchise will be canceled. Bus operators, as a rule, are irresponsible for damages to property and liability to persons. They can get permits almost without investigation as to character, or as to the need of bus service. There are few laws or ordinances regulating the operation of buses, whereas in some cities the railways are subject to fines if they inadvertently fail to pick up passengers.

It is first vital to know whether the public will use motor buses, even at an increased rate of fare. Investigations show that the public is eager to use the bus. In London the buses carry more passengers than all the surface railways in the Borough of the Bronx and Manhattan in New York City. Paris has 1,000 highly profitable motor buses. Birmingham, Liverpool, Manchester and Sheffield have all found important applications for the motor bus. The most important bus company in the United States is the Fifth Avenue Coach Company, New York City, which for the fiscal year ended June 30, 1919, carried 36,488,447 passengers a distance of 8,022,026 miles in 279 buses. The drivers and conductors on these buses are the most courteous employees in the city. When all of the seats are occupied, no more passengers are admitted. Schedules are adhered to, and the service is so excellent that the buses are liberally patronized despite the 10-cent fare.

When contrasted with overcrowded, poorly ventilated trolley cars and the 5-cent fare, it is hard to believe that similar service could not at once be profitably installed in many cities of the United States with populations of 100,000 or more.

The question arises as to whether the bus can best be applied by independent agencies, as a competitor, or whether it should be operated by electric railways as part of their monopoly. The report of the Federal Electric Railways Commission recognizes the jitney and the motor bus as factors in transportation, and recommends that these forms of conveyance, when operated as public carriers, should properly be subject to equivalent regulations. This is in line with the expressed belief of J. H. Pardee, president of the American Electric Railway Association, that if there is to be a test of the two means of transportation, it should be conducted under the same conditions. Either the motor vehicle should be compelled to assume the burden of taxes, of imposts such as street paving, street cleaning and snow removal and of service requirements as to routes, schedules and equipment, or the electric railways should be relieved of these burdens.

There is a logic and equity about this viewpoint which is hardly to be disputed. Mr. Pardee has enunciated an unassailable principle, but in practical work there are other factors to be considered. The automobile industry is not immune from levies. In taxes and license fees it pays $100,000,000 yearly to city, state, and nation. Motor buses should bear their share of the taxes and other obligations, but the regulations imposed upon them should be equitable and not punitive, and should not be planned to protect monopolies that are defaulting in their obligations.

AFTER ALL IT IS A MATTER OF COST

The question of which can serve the public more cheaply is naturally important in any effort to determine the place of electric trolley or motor bus. While there is abundant material dealing with this subject, the conditions vary so greatly that no set of figures can have a general application. It costs the Fifth Avenue Coach Company about 8.5 cents to carry each passenger as compared with a 10-cent fare. In spite of its many advantages, this company has not been uniformly successful. There can be no question of profit on earnings with regard to New York's other bus lines, for they are backed by the city and any deficit comes from the taxpayers.

The lower cost of motor-bus equipment, as compared with electric railways, is shown by an examination of the figures of the London system. The number of passengers carried in 1912 by the London railways was about the same as the number carried by its omnibus system. The aggregate length of routes operated by railways was about 148 miles, and more than 300 miles by the motor buses. At the close of 1912 the total London railway investment, less the accumulated sinking funds, was $53,000,000, while the amount of capital employed by the omnibus company, as evidenced by its outstanding securities, was only about $15,500,000. Thus we find that the London railway investment was about three and a half times that in the omnibuses, to carry the same number of passengers. Manhattan and the Bronx surface railways, carrying only 20 per cent as many passengers, had an investment twelve times as great, or $190,000,000.

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*Abstract of address at the annual convention of the American Electric Railway Association, Atlantic City, N. J., Oct. 14, 1920.

BUS HAS ADVANTAGE IN LOW OVERHEAD

Recognizing that actual figures vary widely according to conditions, I have sought to make a comparison that will be applicable to the average American city of more than 250,000 population. It is based on public report of electric railway costs and known figures of motor vehicle operation.

Let it be supposed that an electric railway company is confronted with the necessity of providing service in the suburb whose most remote point is three miles away from the present extreme of the line. The requirements involved are: The line is on city paved streets, fifteen-minute headway is to be furnished, 1,500 passengers per day are to be carried, sixteen-hour service is to be given during 365 days of the year, the territory is level, the electric railway line is single track, and the fare to be charged is 10 cents. The query is: Which is better, to extend the trolley tracks or establish a bus line? Figures on this point are given in Table I.

TABLE I—COMPARISON OF ELECTRIC RAILWAY AND MOTOR BUS FOR SUPPLEMENTARY SERVICE

	Railway	Bus
Investment required	$200,000	$35,000
Number of vehicles operated	3	3 (plus 1 reserve)
Speed in m.p.h.	10	12
Number of operators per vehicle	2	1
Passenger capacity per vehicle	45	25
Passengers per trip per vehicle	12	12
Operating expense per mile of line	$17,000	$17,742
Operating expense per vehicle-mile, cents	36.3	37.9
Number of vehicle-miles operated	140,160	140,160
Revenue per vehicle-mile, cents	38.9	38.9
Cost per passenger, cents	9.19	9.72
Net revenue per passenger, cents	0.81	0.28
Total cost per day	$137.97	$145 82
Net revenue per day	12.03	4.18
Net revenue per year	4,390.95	1,525.70
Interest on the investment, per cent	2 2	4 3

If the above line were to be extended one mile and the fifteen-minute service maintained, that would involve $65,000 additional capital for the trolley line as against only $6,000 for the bus line. Obviously, the smaller the capital expenditure, the greater the return will be, provided the revenue remains constant.

Another angle to be considered is the increase of service after a project has been installed. Suppose in the above case the headway is reduced. This will involve the operation of additional vehicles and the handling of more passengers. For fifteen-minute headway, three cars or two buses would be required; for ten-minute headway the figures would be four and three, for five-minute headway eight and six, for three-minute headway twelve and eight, and for two-minute headway eighteen and twelve. This shows how the number of vehicles increases as the service is increased. Of course, it costs the railway more to place each additional car in service than to place a bus in service. The car costs new $15,000, as against $5,500 to $6,000 for a bus.

SOME FACTS FROM EXISTING BUS LINES

In many places successful, independent, suburban motor lines are already in operation. Among them are the following:

The Wilkes-Barre line operates forty-nine buses, 4 miles in the city and 7 miles interurban, on a seven-minute schedule, one man to a bus, as against a fifteen-minute trolley schedule, two men to a car.

The Suburban Transit Company, Plainfield, N. J., a subsidiary of the Spicer Manufacturing Corporation, operates thirteen motor buses, ranging from 1-ton to 5-ton, with a passenger capacity of from twelve to seventy-five. Under its contract with the Spicer Corporation, the company agrees to furnish, for those Spicer employees who live in Plainfield, free transportation to and from the plant. This line is operated at cost, monthly statements being sent to the Spicer company. For public service the company operates a line from Plainfield to South Plainfield, a distance of 3½ miles, for which a 10-cent fare is charged. Other trucks are available on arrangement for picnics, parties, tours, etc. The operating cost varies from 40 cents per mile to 80 cents per mile, the average being 45 to 60 cents, depending upon operating conditions.

The experiences of the Fifth Avenue Coach Company show that it could not operate on a 5-cent fare basis, even with its double-deck, forty-five-passenger bus. This system is most efficiently run, yet the operating cost, exclusive of taxes, was 29.03 per cent per bus-mile.

The Baltimore Transit Company, in spite of a passenger density of 5.5 passengers per bus-mile, was unable to make ends meet on a 6-cent fare, and can hardly hope to do better than break even on the present 7-cent fare.

Many instances here given argue against the bus as a competitor, but the service rendered by the Fay Motor Bus Company at Rockford, Ill., points the contrary. On the buses of this company a 10-cent fare is charged as against a 7-cent fare on the trolley. Workmen have shown a willingness to pay the extra fare in order to travel on the Fay buses.

It is claimed that the Fay buses operate at an average of 16 cents per bus-mile, as against 19.38 cents for the one-man safety car. Each Fay bus seats from twelve to nineteen passengers. The urban lines extend 4 miles from the center of the city, and the interurban lines 37 miles from Rockford. Outside the city limits the fare is 4 cents per mile. These lines have been in operation for three years, and even in the severe storms of 1919 missed only three trips through snow.

On this subject there are thus varied views. It is well to look at them soberly. Many excessive claims for the motor bus develop at times of tension between trolley companies and the public. There is, no doubt, a general public feeling that motor buses could well be applied to both urban and suburban transportation. The important factor in city transportation is freedom from traffic congestion. This is the great advantage of the Fifth Avenue buses, which load and unload passengers at the curb, keeping the center of the highway free for private vehicles. There is also a safety factor here, only twenty-three accidents having occurred on this system in 1919, of which only one proved fatal.

MUNICIPAL OWNERSHIP IS NOT THE ANSWER

Of the three ways that buses can be operated, namely, by the trolley companies, by independent companies and through municipal ownership, the last named is the least desirable. The events of the last four years have changed many of our ideas, and we no longer think of government ownership as a panacea. Motor buses should not be allowed to compete with established trolley lines. Duplicate transportation facilities never work out satisfactorily or permanently. Furthermore, trolley companies are entitled to protection on account of their capital invested.

There are many benefits to be gained by having the electric companies themselves operate buses in conjunction with their lines. Buses can give service on streets parallel to congested trolley tracks, and thus not only handle passengers on the parallel streets but make possible a faster trolley service. The bus could offer also a short cut between factories and principal residential districts, thus avoiding the transfer of large masses of rush-hour riders at a few overcrowded points. The bus would offer the possibility of a flexible fleet of vehicles to help in emergencies.

The problem among the smaller cities is very intelligently dealt with by the Waterbury Chamber of Commerce, which after a careful investigation recommends: (1) That the trolley must be given the exclusive business on the streets now occupied by its track; (2) that jitneys and motor buses shall be permitted to operate only on streets not now served by the trolley; (3) that if with such advantages the trolley cannot or does not provide adequate service at reasonable rates, provision shall be made to allow a supplementary use of motor vehicles.

THE CHANGE SHOULD BE GRADUAL

Wherever a trolley company can substitute motor-bus equipment for trolleys, it should do so, but the change should be gradual. This would to a considerable extent retard an over-rapid depreciation, and would make it possible to supply less costly facilities for those that wear out. But in the last analysis the trolley company should treat its inventories just as a manufacturer treats machinery which he finds out of date, and for which he substitutes new equipment even at a loss, remembering that that which is economically in error cannot be artificially kept alive.

One of the greatest problems that now confronts the electric railway company is the need of giving service into newly opened sections. This is a constant case of conflict. A new suburb develops; its residents demand service. The railway company investigates and finds that the utmost possible patronage to be gained will not permit an even break on the costs of installing a new line. Then it either declines to add a spur to its existing trackage, and thereby increases the public resentment against itself, or establishes such a line and accepts a loss.

Either of these alternatives involves an error. There is a better means. The motor bus affords the answer. It is but just that the electric railway should profit by suburban extension, for it was largely responsible for the early stages of the away-from-the-city movement. It has been argued as an objection to the use of buses in such service that they cannot be operated satisfactorily in winter weather. Experience has shown that the bus fares little worse under such conditions than the trolley. In Wilkes-Barre and Scranton last winter the regular electric service was handicapped for several days, whereas the bus line in Wilkes-Barre maintained almost normal schedules. The experience was somewhat similar in New York City. The Fifth Avenue Coach Company has a snow-fighting force patterned after the Fire Department, reducing interruption to traffic to a minimum.

In respect of accident fatalities, and damage suits resulting therefrom, London reports show that the buses kill five times as many persons as the electric railways, but it is to be remembered that in London the bus renders its service in the most densely crowded sections. The New York figures indicate that the bus accidents are not numerous. In one year there only one person was killed and twenty-two injured by the Fifth Avenue buses.

Already seventeen electric railway companies in this country are operating motor buses as feeders and auxiliaries. I believe that there is not an electric railway company in the United States that could not somewhere with profit apply motor vehicles in its system.

I would suggest that you bring in the motor vehicle man for consultation. Tell him your troubles. Get his ideas. He is an expert specialist in transportation subjects. It is more than likely that he will have some valuable suggestions.

At this point I desire to direct attention to some methods by which trucks could effect a direct economy in operation and maintenance: (1) Emergency trucks stationed in various zones and equipped with power and emergency equipment for temporary repairs can rerail cars, remove lines, shut off power in case of fires, repair overhead or underground construction, repair electric switches and string new wires. Cable can be laid and pulled with winch-equipped trucks. (2) For sand distribution trucks are useful. By this procedure one company has saved $8,260 per year. Salt can also be distributed thus advantageously. (3) Ties, rails, crossings, centers and paving material can be effectively handled by truck. (4) Pull-trailers, melters, sand-blast machines, welders and riveters can be placed by motor truck much more quickly than by horses.

I question often if the great public understands how enormously the resources of the American motor-vehicle manufacturer have grown. The United States, with one-sixteenth of the world's population, has ten times as many cars and trucks as the rest of the world put together. There are in the United States something like 8,000,000 motor vehicles, of which 800,000 are motor trucks. The total value of motor vehicles, parts, tires and accessories for 1919 exceeded $3,166,000,000,000, This would seem to be a good industry to depend on for equipment.

WINNING THE PUBLIC GOOD WILL

So far I have looked at the subject largely from the standpoint of money making, but there is still another factor that is of most vital importance.

I believe that the greatest gain to the electric trolley company in the application of buses would not be in larger cash receipts, but in an increase of good will. A great gain could be made in public esteem by having a squadron of emergency vehicles to handle rush traffic. For such service additional street cars, even if available, cannot be readily operated on already overcrowded tracks, but I have never been able to understand why there could not be fleets of motor buses running over the congested routes during the morning and evening hours, on the same and parallel streets. I should call them "good-will-service" buses, and should make clear in newspaper advertising that they had been applied in an effort to win the friendship of the public.

These auxiliary buses could be routed from day to day as occasion demanded. They could be used in the afternoon to handle baseball crowds, and in the mornings to take women shoppers down town. They could be applied to special picnics, the hauling of circus crowds and various similar functions. They could carry their good-will service into the suburbs.

As to the cost of these buses, all of the items of expense are definitely known. Against these costs the railway official could set the revenues to be obtained at a rate of fare higher than the trolley fare.

USE OF TRUCK ADVANTAGEOUS IN FREIGHT HAULAGE

I have presented the doctrine that in respect to passenger traffic the motor vehicle is an ally—not a competitor. I wish exactly to reverse this position when dealing with the subject of freight haulage. Here I consider the motor truck not an ally, but a competitor; in fact, except in isolated cases the suburban trolley is barred from developing any considerable volume of freight haulage. Fifteen years ago there seemed a great opportunity for the electric railway in freight haulage but now it is in the middle position, with both ends being played against it. In long-distance movement of heavy tonnage it is surpassed by the steam railroad; in short-distance transit of less-than-carload lots, up to 100 miles, it cannot compete with the motor truck.

The trolley is limited by its trackage; it cannot reach the distant outlying points as can the truck. Nor can it economically use trucks as feeders to haul freight to central points, thence to be transported to cities by trolley, for the reason that such a system would mean trolley shipment only part of the journey. Whatever economies might be effected within this limited distance would be more than overcome by the cost of unloading from the truck, loading on the trolley freight car, unloading at the terminal and then reloading on truck or other vehicle to complete the journey.

The ability of the motor truck to give a door-to-door service over an extended distance is a distinctive and inestimable advantage, and one that applies especially in the handling of anything so perishable as food products.

The only chance for the trolley as a factor in freight movement is to cater to such factories, farms, mills, stores or warehouses as are located directly along its line, thus eliminating extra haulage by other vehicles. Actually the haulage of freight has never become a very great revenue producer for the electric railways, although data obtained from Secretary E. B. Burritt shows that 404 companies have special facilities for freight service.

Regarding truck freight transportation facilities it is true that only about 12 per cent of the roads in the United States are surfaced, but their mileage, 296,290, is greater than the total steam railroad trackage and sixteen times as great as the electric trolley. The use of the motor vehicle is becoming a habit. One man in every fourteen in the United States has passed the pedestrian or wagon stage of conducting his business and applies motorized efficiency. Iowa and Nebraska show one vehicle to every half dozen of population. Therefore, shipping by truck seems the natural development.

Nowhere has trolley freight transportation been more successfully applied than in Indianapolis, the yearly figures being 400,000 tons with a revenue value of $1,500,000; yet here the motor truck is cutting heavily into the interurban freight revenues. Lines radiate to Michigan, Ohio, Illinois and Kentucky, with an average radius of about 100 miles. There are four companies operating or connecting with seventeen different roads.

Some trolley companies are attempting to deal with the situation by operating their own trucks as feeders to their electric lines. The Chicago instance is typical. Four truck lines approach Chicago respectitvely from the north, west, southwest and south, but owing to their lack of terminal connections in Chicago their service is not yet available for the Chicago shipper. This motor express feeder service is already handling approximately 50 tons per day, and is operating six trucks and two trolleys.

There are in the United States 6,361,502 farms. Senator Capper of Kansas has estimated their total value at $70,000,000,000, and states that at some stage of its transit from point of production to point of consumption $21,000,000,000 worth of food, dairy products and live-stock products go over the highways. Just as I have conceded that the number of passengers in our great cities is too enormous to be handled by motor buses, so equally I am certain that electric railways cannot hope to make more than a dent in supplying transportation facilities to the American farmer. There are too many of him and he is too widely spread.

On the contrary, the motor truck is here rendering a service to which it is ideally adapted, and its application is already having a most considerable effect. The main advantages of the truck are: (1) It gives wider production area; (2) it definitely lowers cost of foodstuff without detriment to the farmer by saving much excess transportation cost; (3) it shortens time of transit to market, thereby increasing the farmer's producing hours on the farm, and (4) it assures the prompt arrival of perishable products at the door of the consumer when they are in best condition and command the highest prices.

There are possibly 10,000 motor haulage lines in the United States at this time, some of which have investments as high as $2,000,000. They are doing an enormous business. The volume of business being developed by the truck is not being drawn from the trolleys alone. R. C. Wright, general traffic manager Pennsylvania Railroad, expresses the opinion that the haulage of less-than-carload lots of freight for distances of less than forty miles cannot be made to pay. Of the 659 steam railways belonging to the Short Line Association, 419 have less than 25 miles of track. Hence, if Mr. Wright is correct, these roads are being operated in economic error and cannot hope to be successful. In the natural course of events they must give way to a better adapted medium, the motor truck, and I feel that this is equally true of the trolley car.

The electric railways dominate urban passenger transportation; they should concentrate on that. They should apply their highly developed organizations and go after public good will. They should eliminate the motor bus as a competitor by making it part of their equipment.

They should not figure too hopefully on freight revenues; in this field they are handicapped, and sound business would dictate the withdrawal of their facilities where they cannot successfully compete with steam railways and motor trucks.

Above all they should banish prejudice, forgetting past wrongs and unfair competition, and look to the future. They need revenues. Provided they can get these what difference does it make whether the power that mints the coin comes from the leap of the electric current or the explosion of the internal combustion motor?

American Association Proceedings

Notable Address by Gov. Henry J. Allen of Kansas a Feature of the Program—Addresses on the Place of the Motor Bus Attract Much Attention—Discussion on Public Relations, the Federal Commission Report and Training Electric Railway Personnel Were Other Important Subjects—Philip H. Gadsden Enthusiastically Acclaimed as New President

THE first session of the thirty-ninth annual convention of the American Electric Railway Association began about 9:45 a.m. Oct. 12, when President Pardee called the meeting to order in the Greek Temple. There was a large attendance. The first order of business was the president's address, which is published elsewhere in this issue.

Secretary Burritt then presented the report of the executive committee, which was not read as it consists of the minutes of the different meetings of the committee and will appear in the printed report. Mr. Burritt then read the report of the secretary and treasurer. This was followed by the reports of the committee on compensation for carrying United States mail. Both of these reports appear in abstract below.

By electing Philip H. Gadsden to its presidency the American Association showed its appreciation of the notable contribution to the rehabilitation of the industry which he made during his service as a member of the Federal Electric Railways Commission.

REPORT OF THE SECRETARY-TREASURER

The report of the secretary described the activities of the year. The mid-year meeting at Cleveland on Jan. 8 was first mentioned. A brief summary of the other principal activities follow.

The association assisted in the distribution of the report of the Federal Electric Railways Commission and in the work of securing for it proper publicity in the press of the country. Addresses delivered by President Pardee before the annual convention of the Chamber of Commerce in the United States in April and the National Association of Credit Men in June were abstracted and advance copies furnished with release date to about 1,200 newspapers. Other special bulletins and statements and special reports of the Bureau of Information and Service have been furnished to the financial and daily press. In the coal situation the association has co-operated closely with the National Electric Light Association and the American Gas Association in the presentation of all matters before the governmental authorities, and at hearings before the Interstate Commerce Commission on priority coal orders.

It has also been represented at the hearing before the Interstate Commerce Commission in the electric railway mail pay case, and has printed and forwarded copies of the complete findings of the commission to all member companies. *Aera* has satisfactorily fulfilled its function. It has recorded fully the activities of the association and of the various company sections and has continued to aid in the general publicity work of the industry. The August issue contained probably the most complete presentation of the work and aims of the association that has ever been printed. Announcement of the resignation of Harlow C. Clark, for the past seven years the editor of *Aera*, is made with regret. Mr. Clark brought the magazine to its present high standard and his personal contribution to its pages, embodying the results of constant and intelligent study of the electric railway problems over this period of years, has set a high mark in the literature of the industry. The publication of a book, "Service-at-Cost Plans," by Harlow C. Clark, by the association in June is mentioned.

In accordance with the action of the executive committee at the Cleveland meeting in January, Charles L. Henry, chairman of the committee on national relations, was appointed in charge of the Washington office. The membership of the association in the Chamber of Commerce of the United States is maintained, and there should be no question that the association membership and active participation in the activities of the body will be of great benefit to the industry. The association has recently taken membership in the National Industrial Conference Board. Other national meetings and conferences at which the association has been represented officially have been those of the United States Chamber of Commerce, Federated American Engineering Societies, National Association of Traffic Officers' Convention, National Industrial Conference Board and Federal Highway Council. From Nov. 1, 1919, to Sept. 30, 1920, twenty-one railways have been enrolled as new members, with a number of others in immediate prospect, and eighteen have resigned. Eighteen manufacturing companies were enrolled and twenty-four have resigned. Individual membership during this period showed a net loss of forty, and the

INCOME STATEMENT TEN MONTHS ENDED AUG 31, 1920

Revenues:	
Admission fees:	
Railway companies	$140
Manufacturer companies	140
Total	$280
Annual Dues:	
Railway companies	82,496
Manufacturer companies	15,497
Individuals	2,157
Total	$100,150
Miscellaneous Income:	
Interest on deposits	228
Interest on investments	557
Sale of year books and proceedings	105
Sale of engineering manuals and binders	102
Sale of "Cost of Urban Transportation Service"	700
Sale of bibliography on valuation	1
Sale of miscellaneous pamphlets	270
Sale of dinner tickets	5,480
Contribution hotel men's assn	4,483
Total	$11,928
Aera:	
Advertising	13,197
Subscriptions—Railway companies	2,450
Subscriptions—Manufacturer companies	1,410
Subscriptions—Individuals	1,438
Subscriptions—Company section members	2,455
Paid subscriptions	174
Sale of extra copies	24
Sale of binders	18
Total	$21,179
Total revenues	133,538
Expenses:	
American Association	94,123
Aera	34,755
Total expenditures	$128,878

EXPENSES TEN MONTHS ENDED AUG. 31, 1920

American Association:	
Salaries	$37,301
Rent	3,906
Postage	3,421
Office supplies and expenses	2,570
Express	137
Telephone and telegraph	3,010
Stationery and printing	7,431
Repairs to furniture and equipment	160
Traveling expenses of staff	2,141
General expense	3,540
Exchange	105
Miscellaneous pamphlets	1,925
Mid-year meeting	481
Mid-year dinner	5,485
Proceedings and advance paper	8,750
General convention expense (1919)	1,756
Convention entertainment expense (1919)	233
General convention expense (1920)	732
Convention exhibit expense (1920)	1 037
Hooper-Holmes Bureau	500
"Cost of Urban" Transportation	1,960
Washington office	7,533
Total expenses	$94,123
Aera:	
Salaries	11 291
Postage	341
Rent	565
Telephone and telegraph	470
Discount	172
Traveling expenses of staff	1 342
Magazine expense:	
Printing	14 750
Paper	4 372
Mailing	500
Cuts	950
Total	$34,755

STATEMENT OF COMPANY MEMBERSHIP SEPT. 30, 1920

	Railway	Mfg.	Total
Number of members Nov. 1, 1919	315	240	555
Number of members reinstated	20	4	24
Number new companies	21	18	39
	356	262	618
Resignations	18	24	42
Net total	338	238	576

STATEMENT OF INDIVIDUAL AND COMPANY SECTION MEMBERSHIP SEPT. 30, 1920

	Individual	Company Section
Members, Nov. 1, 1919	929	1 938
New members	38	42
	967	1 980
Resignations	78	71
Members, Sept. 30, 1920	889	1 909

company section membership showed a net loss of twenty-nine.

Considerable space was given to the report of the Bureau of Information and Service. Prior to 1918 this department handled about 500 inquiries annually. Last year showed an increase of 1,019, while the year just closing showed a total of 6,532. During the month of September 940 requests were answered. A list of the subjects of this information most in demand was given. More than 900 different companies made requests for information during the year, or an average of more than seven requests per company.

In conclusion, the secretary spoke of the loyalty of the office staff and made special reference to J. W. Welsh, the association's special engineer.

There are nine appendices giving detailed lists of the number of requests made for information on various subjects, special compilation prepared by the Bureau of Information and Service, questionnaires sent out, circular letters sent out, bulletins on the fare situation sent out, bulletins on the labor situation sent out, etc.

A summary of the report by the treasurer appears in the adjoining column.

COMPENSATION FOR CARRYING UNITED STATES MAIL

During the fall of 1919 the committee completed, with the assistance of special counsel S. S. Ashbaugh of Washington, the brief for presentation to the Interstate Commerce Commission and conducted the oral argument before the commission in Washington on Dec. 6. The commission did not hand down its decision until Aug. 7, and the decision was not communicated to the association until two or three weeks later. In the decision, copies of which have been sent to member companies, the effective date for the new rates was set as Dec. 6, 1920, just one year subsequent to the date of the final oral argument before the commission.

While the commission by the terms of its order has materially improved the existing situation concerning mail pay, nevertheless the committee feels that as a whole the decision is disappointing. It was hoped that as a result of the voluminous testimony and the earnest efforts made to present to the commission the injustices and impositions of the Post Office Department in the past it would adopt a more broad-minded and liberal attitude. In the judgment of the committee the commission signally failed to do this and did not give the railways the rates to which they were entitled.

Electric railway mail pay by this decision has been definitely put upon a space basis, although the definition of space is not as clear as it should be and it may be interpreted so as to inconvenience seriously mail carriers, particularly where mail is handled on passenger cars. The previous unfair and nebulous rates have been clarified to some extent in that the number of pouches to be carried for the minimum rate is limited to ten. This minimum rate has been increased 33⅓ per cent. When more than ten pouches are carried the order as indicated above is not clear, although there is provision for increased pay for each additional unit increment of 30 cu.ft. of space used. Further, there is a provision for tests to be made at least once in two years for determining the number of articles of mail that will fill the unit of 30 cu.ft. One significant provision of this portion of the order is the provision for conducting tests, "with the presence and assistance" of the railway officials, which is felt by the committee to be a recognition by the commission of the unfairness of the former practice of the Post Office Department in secretly handling and compiling all data relative to weights, space, etc., both on street railways and on steam railroads.

The rates laid down for independent cars and for railway Post Office cars are faulty, because they provide for no return on the value of the investment, the commission apparently having attempted merely to cover the operating costs for 1917. A new departure is the authorization of space on baggage and express cars, and here, too, it is felt the rate is too low.

Relief from side and terminal service has been provided, it being optional with the companies whether they will perform this work, except, of course, where directly contiguous to the right-of-way. A clear indication of the narrow-minded way the commission has treated the subject of compensation is shown in its allowing but 3 per cent over and above the actual cost of handling side and terminal service for supervision, accounting and general overhead expenses connected therewith.

While the situation has been somewhat clarified, the committee recommended that a committee on mail pay should be appointed for the ensuing year to continue work on this subject. The report was signed by V. S. Curtis, chairman; Charles L. Henry, G. K. Jeffries, P. J. Kealy, L. H. Palmer, Samuel Riddle, W. S. Rodger and C. L. S. Tingley.

Mr. Palmer, who read the report on United States mail, in the absence of the chairman, Mr. Curtis, added that Mr. Ashbaugh, the special counsel in this case, contends that this order is illegal and inconsistent with the decision of the Interstate Commerce Commission in the steam railroad mail pay case, docket 9,200. He thinks that the first duty of this association is to decide whether it wishes to file a motion to amend the order to make it conform to the law, as he believes it exists on the statute books. He also says that in his opinion under this decision no road need carry any mail until Dec. 6, 1920, when the order becomes effective, and that if this should be done it would most effectively bring the matter to the attention of the commission.

ELECTROLYSIS

The report of the committee on electrolysis was then presented by Calvert Townley, chairman. Mr. Townley's written report, which was very brief, simply stated that in accordance with the policy of the American committee on electrolysis the association committee had confined its activities to serving the delegates of the association, and that as there had been no calls upon it no meetings had been held. He recommended, however, that the association should continue the committee, so that it might be ready to act if necessary. In discussing his report he then explained more the purposes and functions of his committee, which he said was one of a series of similar committees from nine associations and also the Bureau of Standards, all forming the American Committee on Electrolysis. This committee was organized some ten years ago to unite the interests of the associations mentioned, which comprise all of the national associations representing corporations owning metallic structures in streets, the purpose being to study the electrolysis situation in a scientific manner. After about three years the committee produced a report which was confined largely to facts definitely determined and also to definitions compiled so that the various technical organizations forming the committee would talk the same language. During the war the committee was largely inactive. Recently there has been more activity. One of the arrangements which has been made by the American Electric Railway Association committee on electrolysis has been to appoint a representative to act with the Bureau of Standards in regard to any investigations which the bureau may conduct on the subject. This representative is L. P. Crecelius of Cleveland. Mr. Townley believes that from the work undertaken the number of disputes would be materially less, as the present plan provides a way by which the representatives of the interests affected can get together.

NATIONAL RELATIONS

Mr. Henry then read the report of the committee on national relations. An abstract follows:

The present organization of the committee on national affairs is practically a merging of the former committee on national relations and a subcommittee thereof known as the committee on national relations, and the committee was appointed at a time when Congress was considering the subject which afterward resulted in the passage of the transportation act of 1920. The committee found much to do before the passage of that act and was largely responsible for amendments proposed and accepted for the purpose of protecting interurban electric railways from being classed with steam railroads, where it was apparent that this would be injurious to the electric companies. Principal among the revisions urged by the electric railway companies and accepted was the provision that the issuing of securities by interurban electric railways should be under the control of the State public service commissions instead of the Interstate Commerce Commission; another that excluded them from the jurisdiction of the proposed United States Labor Commission; another that they should be excluded from the general provisions of that part of the act which provided for the grouping of railroads into districts, their appraisal and establishment of specific rates if they were not operated as a part or parts of a general steam railroad system or were not engaged in the general transportation of freight.

After the law was enacted many questions in connection with it developed. The first and principal one to call for the attention of the committee was the provision (Section 15-a) understood as an amendment to the interstate commerce act, which excluded the interurban electric railways, except where they "were operated as a part or parts of a general steam railroad system or engaged in the general transportation of freight." This called for a construction by the commission, so that any interurban electric railway might know whether it was or was not to be classed with steam railroads under this section. Finally the commission sent out questionnaires to various companies to get the facts on which they might base the construction of that clause. These questionnaires have quite generally been answered, but up to date the Interstate Commerce Commission has given no ruling in the matter. It is probable, indeed, that it will eventually be decided independently for each separate company.

Sections 300 and 301 of the transportation act deals with the appointments and duties of the United States Railroad Labor Board, and recently cases have been referred to that board concerning disputes between several electric interurban railways and their employees, and the board has to decide the question of jurisdiction. A hearing on this subject before the

Labor Board was set for Oct. 5, 1920, but nothing definite was determined. Several other cases are set for Oct. 18, and in the hearings on these the Labor Board is very likely to pass upon the question of jurisdiction where the cases relate to interurban electric railways.

The coal situation has received a great deal of attention at the hands of the committee and, co-operating with similar organizations from other utilities, the provisions in the service orders issued by the Interstate Commerce Commission for the benefit of electric railways and other public utilities were secured.

The chairman of the committee has been charged with oversight in management of the association's Washington office, which is at 950 Munsey Building. Paul W. McGovern is assistant secretary of the committee and personally in charge of the Washington office. He is there all the time to give attention to personal calls and inquiries and also calls by telegraph, telephone and mail for whatever information or assistance members of the association may require. With the reassembling of Congress there will be, undoubtedly, numerous matters of legislation which will claim the close attention not only of the committee but of the entire industry. In the meantime, the work before the Interstate Commerce Commission and the Labor Board and the various departments of government has presented many questions which the committee has been called upon to take care of.

At the conclusion of his written report Mr. Henry explained that under the rules of the Interstate Commerce Commission every road under its jurisdiction must have a representative in Washington upon whom notices can be served and to whom orders can be delivered. The Washington office of the association is in a position to assume this responsibility for any member company which desires such a service. In that case Mr. Henry explained that the companies should supply him with a power of attorney made out in his individual name. That will make further representation unnecessary.

PROBLEMS OF FUEL SUPPLY

A paper entitled "Problems of Fuel Supply" was then read by Eugene McAuliffe, president Union Colliery Company, St. Louis. An abstract is printed on another page.

James D. Mortimer had prepared a written discussion on Mr. McAuliffe's paper, but it was not read on account of the lateness of the hour. It will be included in the record, Mr. Mortimer being absent. In his discussion Mr. Mortimer summed up in a few words the various difficulties enumerated in the paper with which the coal industry has had to contend in recent years. He then commented that correction of the difficulties of the coal business must start at home, for he thought all progressive operators were ready to admit that there are internal problems requiring solution. He contended that assistance from coal customers is also required and that legislation would not be needed if all operators and all customers would work to a common end. Mr. Mortimer then spoke about the growing importance of the network of electric power transmission lines originating at more or less economical generating plants and the electrification of the railroads, in connection with the solution of the problems of fuel supply.

A. G. Gutheim, manager public relations committee, car service division, American Railway Association, Washington, and formerly with the Interstate Commerce Commission, appeared before the association at this time to discuss Mr. McAuliffe's paper on the problems of fuel supply. He said he wanted to emphasize two points made by Mr. McAuliffe, that the coal industry must get ready to carry a larger load and that the need for taking steps to bring about a uniform load on both the coal mines and railroads was paramount. He said that few people appreciate how miners must be content with but two or three days' work a week during a good share of the year. This is a primary cause of a great deal of the labor disturbances. Referring to the quotation from Herbert Hoover that the mines were more than 20 per cent overdeveloped in order to handle the peak load, he declared that he was of the opinion that the mines were overdeveloped 80 per cent, giving reasons for his conclusion. This matter of load factor is a very serious problem.

He then spoke of the impossibility of railroads conforming absolutely to an even distribution of a limited supply of cars among various mines. He also spoke of the Interstate Commerce Commission rule which had made it possible for the public utilities to go to a mine and contract for their daily requirements under a guarantee of adequate car supply to handle the order. This, he pointed out, was the very thing which the railroads were condemned for doing twelve years ago. The result of the order was that some of the mines did not get any cars at all for periods as long as two weeks. Upon investigation as to the reason for this, it was found that so many utility companies had gone into Kentucky, which was non-competitive on account of the fact that this coal was not shipped for export, to make their coal purchases that all available cars had been drawn into this territory under the I. C. C. ruling. Speaking of the reference in the paper to the fact that a 50 per cent car supply was all that had been secured, he declared that this 50 per cent was based not upon what the country needed in coal production but on the maximum potential output of all of the mines of 900,000,000 tons a year. It this 50 per cent were based upon the coal needed, it would be seen to be adequate to transport the normal supply.

Mr. Gutheim then spoke of the seasonal freight rate, and while he though it might help, he did not believe that legislation was the way to go about it. He considered that freight rates are too delicate a structure to be controlled by legislation. He thought also that zoning by a freight rate adjustment was not practical, although the object desired might be accomplished through legislation. In conclusion he made the statement that if there were any specter of which the coal industry has any fear today, it is that the government shall undertake to regulate it. He noted that in two or three states an attempt had been made along this line, and predicted that if this state regulation progresses it will result in controveries between states and national jurisdiction and will inevitably bring about a national commission. This, he said, he would not like to see come, but thought that the only way it could be avoided would be by the members of the industry itself adopting a more circumspect attitude than they have during the last few months.

"AERA" ADVISORY COMMITTEE

R. B. Stearns then read the report of the *Aera* advisory committee. An abstract follows:

Aera has demonstrated itself to be one of the most useful and essential features of the association's work for the industry, and a more progressive and constructive policy for its conduct has been planned and is being made effective. This policy, following the submission of a report by your committee, as heartily indorsed by the executive committee of the association, which, by resolution, called upon all members for support in the following words: "That the executive committee of the American Electric Railway Association urges upon railway manufacturer members and upon railway companies and manufacturers of railway apparatus and supplies generally that they lend their support to the *Aera* advisory committee in its plans for the betterment and improvement of *Aera*." With this policy clearly established by the executive committee, the *Aera* advisory committee has formulated the following plans, which it is believed will greatly enhance the value of the magazine to all association members and thereby provide ways and means for the publication to fulfill to the fullest measure the possibilities for good which lie in this field.

1. Securing constructive editorial discussion from the leading men of the industry.

2. Provision for general articles on timely and interesting topics by leading executives from all branches of the industry.

3. Arrangements have been made for technical articles from manufacturer members of the association of an educational character which will appeal not only to company section members but also to the rank and file of electric railway and manufacturing employees in general. These articles are for the purpose not only of interesting operating, repair and shop employees but also for the purpose of educating them in operating, construction, mechanical and electrical machinery problems of all kinds, which in turn will obviously tend toward lower maintenance cost and less abuse of equipment.

4. Provision for articles and discussions of interest to transportation and traffic managers and all other matters pertaining to this branch of the industry.

5. Articles and discussions by leaders of the maintenance of way, structures and other related problems.

6. Similar articles on power plants, substations, transmission and other problems embraced in this branch of the industry.

7. Special space to be devoted to specific problems confronted by companies in various cities such as those already published with respect to Detroit, Toledo and Bridgeport, an article on the latter being published in the October number, just issued.

8. Improvement and enlargement of the Question Box Section.

9. The great value to members of the association of the Bureau of Information and Service is becoming more and more apparent to the industry, as witnessed by its remarkable growth and extension of usefulness during the past year. It is planned, therefore, to give greater space and thereby more thoroughly inform members as to what this bureau is accomplishing so that all may avail themselves of its service.

10. It is planned to improve the mechanical features of the magazine for the benefit of advertisers.

11. It also is planned to work in closer co-operation in the future with the committee on membership and the committee on company sections, it being fully appreciated by your committee that the magazine can be of very great assistance in the work of both of these important committees.

12. Steps already have been taken to improve greatly the make-up and general appearance of the magazine as a whole. The August and September numbers appeared with a new cover design, which was part of the new plans. The August issue was designed to aid the committee on membership in its campaign for new members and at the same time indicate to the readers of *Aera* the new policy under which the committee expects to go forward and build an important and more valuable publication. It is recognized that a magazine, when properly conducted, is of immeasurable value in securing and holding membership in the association.

In general, it is the purpose of your committee to make improvements and changes and add new features which will give the readers of *Aera* a constantly improved magazine from every standpoint.

The present circulation of *Aera* is approximately 6,500 copies a month. This is far below what it should be considering the field it occupies as the official publication of the association, and your committee is firmly of the belief that this number can be greatly and rapidly increased if all executives and managers of both railway companies and manufacturer companies fully appreciated the great value to the industry as a whole and further realized the value of having their employees read the magazine regularly. Your committee believes that if serious and constructive efforts were carried out to secure additional subscribers the number could be increased several fold.

In planning to place this matter clearly before all members, your committee has divided its field of operations into eight regional districts and has appointed a committee to represent railway and manufacturer members in each district. The duties of these regional committees are to carry out the policy and plans of the *Aera* advisory committee, working in conjunction with the local committees on membership and conducting an active campaign to strengthen and build up this important branch of the association's work.

The entire plan for the betterment of *Aera* of course depends upon the support given your committee by the members of the association. A better magazine undoubtedly will bring steadily increasing circulation and this means better and more extensive understanding of the problems confronting the electric railway industry.

Aera now is a potent force for good, but it can be strengthened and made more valuable with every issue. The work must not be permitted to stand still. It must go forward, and to go forward it must have the active support of every member of the association. The committee bespeaks your co-operation and assistance. The report was submitted by R. B. Stearns, chairman; E. C. Faber, M. B. Lambert, I. A. May, C. C. Peirce, R. E. McDougall, A. M. Robinson and Martin Schreiber.

MR. GADSDEN GIVES VIEWS ON COMMISSION REPORT

Philip H. Gadsden, electric railway commissioner of the Federal Electric Railways Commission, was called to the floor by President Pardee to give some of his views and impressions of the work of the commission. Mr. Gadsden reviewed briefly how the industry had drifted into its present transportation methods from the horse car days and with only horse car experience to guide it. He pointed out how the resultant situation had become continually more difficult and had brought the industry constantly nearer to bankruptcy because of the uneconomic foundation upon which it was working. In referring to the final report of the commission he called particular attention to the fact that it formed the opinion of seven men, of whom five knew no more of the street railway industry than they did of 500 other industries when they began work. What they said in the report, therefore, represents what the people think. If railway operators feel that they cannot subscribe to some of the points made they should consider that the real question is whether or not these commissioners have reflected the real public mind. If so, then they must follow this dictation, for the future depends on whether we follow the code of ethics which the public has thus set up. He thought railway managers must give more and more thought to the consideration of the public.

Mr. Gadsden declared that one great value of the commission report was that for the first time men of the industry are able to cite the findings of an official body as to conditions in the industry. Whereas heretofore they have been under a continual handicap to make the public believe that taxes, paving charges, etc., were overcoming the industry, because the statement came from a biased person, this argument would no longer be necessary, for the railway men can cite an authority for the statement. Likewise, in the past, the exploitation of the railway treasury by the city officials was considered no crime, but when this official body has declared that of every carfare ½ cent goes to taxes, then it should not be long until the great mass of the people who must ride in the street cars will understand this and object to the payment of this sum for the benefit of the property owner who rides in his automobile. Likewise when the men of the industry have endeavored to tell the public that the industry was practically bankrupt, only to be disbelieved, they can now refer to this report, wherein a judicial determination of the real facts has been made.

Referring in a very complimentary way to the work of the Committee of 100, Mr. Gadsden said that the testimony and evidence presented was so complete and exhaustive that when the commission finally gathered to formulate its report there was not a single controversy on any facts regarding the industry. The commissioners were entirely of one mind on the facts, and there was surprisingly little difference of opinion on the conclusions to be drawn from these facts. What differences there were were largely on the importance to be attached to the various conclusions.

In its report the commission has sought, he said, to set up a complete theory for the reorganization of the electric railway industry, and in this connection he called attention to three or four basic things. Up to now, in the negotiations between company and city, each has tried to make the best trade possible, and in this procedure both parties have acted without regard to the considerations of the real party at interest, the public.

Another basic thought brought out in the report, which Mr. Gadsden said was the most valuable contribution of the commission, was the emphasis which had been laid on the restoration of the credit of the industry. Heretofore no one but executives of railways have considered this problem. There has been a popular notion that when money was needed all that was necessary was for the executive to go down to New York, spend a few days in Wall Street and come home with the money. Emphasis had never been laid on the right point, and it now appears that consideration has been given to the wrong people. The real parties in interest are the car riders on the one hand and the investors on the other—service and credit. Mr. Gadsden urged upon the members that they should go forth and preach this matter to the people generally, for the industry has been proved and declared essential and is giving a greater service than ever and yet is prostrate because of lack of credit. The question is, what are we going to do to revive the industry?

Mr. Gadsden endeavored to answer this by pointing out that it was no longer a question of what rate of fare will a city grant, or a supreme court ruling on what is a reasonable rate of fare. The real test of an adequate rate is not that which will produce a proper rate of return on the capital in the property now, but what it is necessary to pay for money from the man who has never put money in the industry before. Is he going to come in on a 6 per cent basis when he can get 10 per cent on securities of the highest rating in other industries? Mr. Gadsden insisted that the electric railway industry has got to be in a position to go into the money market to compete for the money so desperately needed. The proper rate must be that which will meet the demands of the investor, not the City Council.

Mr. Gadsden considered that the best route to follow in the effort to restore credit was by way of the service-at-cost plan or something along that line. He contended that the investor will not come back into the industry under the old conditions; he is not going to put his money into an industry which is subject to the control of some one outside of it. In all other businesses the management forecasts the future and adjusts the price of its commodities to conform to existing or expected conditions, while the electric railway industry has thus far never been able to secure a fare increase until it has proved that it was on the verge of bankruptcy.

In summing up, Mr. Gadsden said that the first step to be taken in working out the situation was to secure an accurate physical valuation of the property. He said there never was a more propitious time than the present to do this, for the appraisers are bound to be affected by present prices.

The second step to be taken was to make the capital value of the property conform to the physical valuation established.

Mr. Gadsden also laid stress upon the fact that harmonious relations with employees must be established in the industry because people are not going to put money into a business which is continually torn by strikes. He said that we must work out a plan which will guarantee continuous operation of the electric railway properties.

In concluding Mr. Gadsden referred again to the splendid work of the Committee of 100, saying that it was the most effective piece of work that had ever been done in any industry, not only in the preparation for the hearings, but in the manner in which publicity about the hearings was spread over the country. He thought that the work of this committee had only begun and that it should be continued by all means. As indicating how the benefit which may be expected to accrue from the report will continue, he said that only last week he attended a meeting of the board of directors of the United States Chamber of Commerce, at which the committee on public utilities of the Chamber filed a most excellent report on the public utility situation. This report was ordered to a referendum vote, so that during the next six weeks it will come before every local chamber of commerce and affiliated business organization, bringing attention to our industry through a very sympathetic report. He said that the electric railways ought to have a representative at every one of these local meetings.

President Pardee then appointed the following committees before adjournment:

Committee on resolutions: B. A. Hegeman, Jr., chairman; W. H. Sawyer, W. C. Ely, W. K. Archbold and E. S. Wilde.

Committee on recommendations in president's address: W. F. Ham, chairman; C. C. Peirce, C. D. Emmons, E. R. Hill and J. H. Drew.

Committee on nominations: Arthur W. Brady, chairman; W. A. Draper, L. S. Storrs, Thomas W. Casey, C. D. Cass, J. W. Perry, L. J. Drake, L. E. Gould and F. R. Coates.

Wednesday's Session

The second session convened in the Greek Temple on Wednesday morning, at which time reports of the committees on fare systems and company membership and publicity were presented. Abstracts of these reports are given below.

Fare Systems

The report of the committee on this subject is a continuation of the investigation conducted last year by the committee on zone systems. In a study of the results of flat fare increase, reports were received from forty-five representative electric railway companies.

In almost all cases when an increased fare was first put into effect there was a decrease in the number of revenue passengers carried. Due to the higher rate, however, this decrease was not sufficient to prevent an increase in revenue. As time went on and the patrons of the company became accustomed to the higher fare the volume of riding increased, and it is the opinion of many of the executives of the companies that they have gotten back practically all the riders lost in the beginning. Many properties have had more than one fare increase, and it has been the experience of a number of them that on the succeeding increases the revenue passengers carried showed no material losses. Where the public has been led to oppose fare increases, the gain in revenue has been limited, but in other cases, where the increase has been taken in a spirit of fairness and justice, the revenue has approached quite closely the theoretical limit. Only general deductions can be stated, because in a number of localities the economic and industrial readjustments occurring since the end of the war have made specific and accurate comparisons impossible.

One of the outstanding effects of the war so far as electric railways are concerned has been the destruction of the idea that a city street car ride should never cost more than 5 cents and the committee is of the opinion that the realization of this fact has been of great service in reconciling passengers to pay the higher fares, especially where more than one increase has been found necessary.

Hereafter, the greatest single factor in forcing still further fare increases will be the demands for higher wages, which are being continually and skillfully put forward by employees. It seems to the committee that it is becoming clearly understood by the public that increases in wages necessarily mean increased fares, and the granting of future demands of this sort will be largely dependent upon the attitude of the public.

MAXIMUM PRACTICABLE FLAT FARE

In the committee's investigations the direct question was asked as to what executives felt was the highest fare that could be charged on their own properties. The answers varied, being obviously influenced by existing local conditions, but the views expressed would seem to indicate that the price of a car ride must be determined by costs of labor, supplies, and commodities. If the country is facing still further increases in costs of living and higher wages, undoubtedly fares must be raised beyond 10 cents. Under existing conditions the large majority of the executives report that for their properties the charge should not be in excess of 10 cents. A considerable number of the executives placed the figure lower than 10 cents, and those placing the figure at 10 cents apparently had in mind the fact that 10 cents is a dime, a standard coin.

In Boston, Mass., where a flat 10-cent fare is in effect, some 5 cent non-transfer lines were provided in the built-up sections of the city in an effort to encourage short riding; but the results obtained were not particularly encouraging, due partly to the lack of transfer privilege, partly to slow operation through congested districts as compared with subways and elevated, and to some extent to lack of interest on the part of patrons in the possible saving.

In Portland, Maine, when the original increase in fares was established some 5-cent lines were put on to operate in the business district with a charge of 1 cent for transfers in case the latter were requested. These lines, which were the result of the suggestions of the Public Service Commission with the idea of encouraging short riders, were not successful from that standpoint, and when a further change in fare was made were abandond.

These two illustrations, while not conclusive, seem to discourage the idea that short-ride, low-fare car lines in congested centers of cities would be successful.

The fact is incontrovertible that costs of living, manufacturing and producing have increased over 100 per cent all over the country. While it is hard to make people acquiesce in the fact, it is inevitable that they must eventually pay proportionately as much more for transportation as they would have to for clothes, food, and other articles. Gradually the public mind is accepting the logic of this situation, and this is one of the psychological factors that are enabling the companies to obtain the theoretical increase when fares are raised, and is one of those underlying elements which are tending to restore the industry to some degree of prosperity.

The committee believes that the experience of the past year confirms the preference for the use of metal tickets expressed by the committee on collection and registration of fares. This has been especially demonstrated on certain systems where the use of the multiple fare paper tickets resulted in abuse by unscrupulous employees and patrons.

The experience of many companies now indicates that a substantial differential between a cash fare and a metal ticket is desirable in order to encourage the use of the metal ticket. There is, of course, ample justification for a higher cash fare because the transient and occasional riders who do not desire to purchase tickets should pay a higher fare for service which is always available for their use.

It is the conclusion of the committee with reference to the above matters:

1. That, for the large number of cities, a cash fare of 10 cents would not decrease the riding habit sufficiently to prevent the obtaining of needed increases in net revenue, and that in very many cities this 10-cent fare is absolutely necessary for adequate service and restored credit.

2. That if an average fare in excess of 7 cents is necessary to establish credit and allow proper service, it would recommend a 10-cent cash fare with such reduced rates, if any are desirable, preferably through metal tickets, as will produce the needed average fare.

JITNEYS IN FLAT-FARE CITIES

Up to even one year ago there was among many a general feeling that increases in fare, especially for short riders, would bring on very much more serious jitney competition. The results show that fear to have been unfounded in many cases, of but slight moment in others, and serious in some cases where the conditions were local unto themselves. Eighty per cent of the replies received to the questionnaire reported no stimulation to jitneys whatever, only 8 per cent reported an actual stimulation, while 12 per cent referred to it as slight or as lasting but a short while. Although the questionnaire did not directly ask for that information, one-third of the answers referred to the increased use of the privately owned automobiles. The general feeling seemed to be that the increase in fares was a negligible factor in the increase in the number of autos, though there was for a short time after an increase in rates of fare a growing practice on the part of auto owners to invite their friends to ride with them.

Sensible regulation has in many communities either eliminated the jitney entirely or confined its operations to streets or districts not adequately served by the railway lines. Although very substantial progress has been made by public authorities at different places in dealing with this question, there are still many localities where the problem has not been squarely faced.

While it is granted that, as summarized above, in many localities the jitney problem has been effectively met, the fact remains that there are still numerous communities in which jitney competition is most serious. The fundamental conditions in connection with this form of unbridled and usually unregulated competition have been stated and discussed on numerous occasions both before the association and in the technical press, but it seems to the committee that it is necessary again to draw attention to this problem. It is entirely possible that we shall, within the next few years, face a slackening of industry and business, and, if this occurs, the jitney menace may again assume more serious proportions.

The only way that a fair trial of the motor bus or jitney service can be made is for the authorities to insist that these vehicles give the same character of service as provided by the electric cars. This means they must furnish dependable and regular service during the early hours in the morning, during the mid-day period and after the evening rush peak, operating on schedule, whether the weather is pleasant or rainy, and going out to the ends of the unproductive or unprofitable routes. Just so long as jitneys and buses are permitted to skim the cream off of street railway traffic, they are working an injustice not only to the car company, but to the citizens and the communities themselves, because they are lessening the possibilities of the electric railroads performing adequately and completely the functions they are to render.

Certainly, the American Electric Railway Association should take the strongest possible ground against the uneconomic and short-sighted practice of some municipal officials in using jitneys as a means of reprisal against street railway companies. This industry of ours is governed by the same economic laws as other businesses, and, if these laws are violated to satisfy the grudges or prejudices of municipalities or politicians, not only the industry will suffer, but the citizens of the community in the long run will be the greater sufferers.

The conclusions of the committee with reference to the jitney situation are:

1. That the operation of jitneys should be confined to non-competitive and supplementary or auxiliary service.

2. That in a number of localities the handling of the jitney problem by public authorities has tended to decrease the operation of jitneys and affords an example to the remaining localities for an effective and farsighted use and development of the urban transportation problem.

3. That this association should take strong ground against unfair motor vehicle competition and should urge its members to combat piratical competition in every way possible.

ANALYSIS OF THE EFFECT OF FLAT FARE INCREASES ON OPERATING REVENUES AND REVENUE PASSENGERS

The results of this study show that increases in carfares have not destroyed the street railway business. The street car is still the ordinary man's conveyance. Detailed information was obtained from a group of forty representative companies operating on a flat fare rate, and from the information furnished, the accompanying chart has been prepared which shows the passenger revenue, revenue passengers, and the average rate of fare by months from January, 1917, to May, 1920, inclusive. There was a consistent increase in operating revenue, amounting for the period in question to 56 per cent. Similiarly there was an increase in revenue passengers amounting to 12 per cent, and the committee's study shows that on the whole there has been a substantial gain and not a loss in revenue car riders.

The weighted average rate of fare was obtained by dividing for each month the passenger revenue by the number of revenue passengers for the entire group. This curve shows a consistent increase in the average rate of fare, from about 4.65 cents to 6.5 cents. Small fluctuations in the average rate of fare, particularly in the early months of 1920, are due largely to the variations in the relative traffic and revenue among the companies in the group, and to the effects of the severe winter weather in certain sections of the country. These curves are all compiled on a logarithmic chart and therefore show relatively, by the slope of the lines, the comparative increases in each of the plotted quantities. Attention is called to the fact that the lesser increase in revenue passengers than in passenger revenue and rate of fare does not indicate a reduction in the riding habit. Such a reduction could accurately be determined only by a comparison with an extended prior period in which no substantial fare changes occurred.

It is, of course, obvious that the bottom two curves on the chart, representing the passenger revenue and the revenue passengers, are parallel so long as the rate of fare is constant; and that the slope of the bottom curve, representing the passenger revenue, will increase in proportion to the algebraic sum of the slopes of the revenue passenger curve and the rate-of-fare curve.

It is significant, however, that during the final two years shown on the chart, in which the greater part of the fare increases have become effective, the growth in revenue passengers has been 12 per cent, as compared with fare increases of 36 per cent. This indicates that in the cities represented on the chart there has been no material interference with the normal growth in traffic as a whole. The yearly average increase in revenue passengers for the forty companies shown on the chart was therefore 6 per cent as compared with the average of 3.7 per cent for all electric railways of the United States as shown by the United States census between the years 1912 and 1917.

The committee believes that the conditions disclosed by this analysis confirm the opinions expressed above as to the transient character of traffic losses and the revenue possibilities of further increases in flat fares.

RESULTS TO DATE OF ZONE SYSTEMS

Two kinds of zone systems have been in operation in the United States. (1) The central area zone system, as used in Milwaukee, Portland (Maine), Providence, Springfield and Holyoke, and (2) the kind more nearly similar to the British system used on the Public Service Railway in New Jersey and the Connecticut Company.

Sufficient experience has been accumulated to show that the central area or fixed minimum zone systems can be successfully operated in American cities. Notwithstanding the fact also that after brief trials in New Jersey and Connecticut uniform rate zone systems have been abandoned, the committee feels that the experience gained has demonstrated that, if deemed desirable, it is practicable to introduce the uniform rate zone system in American communities of large population, but it is of the opinion that it should be done only with a fixed minimum charge.

Results to date have shown most definitely that the minimum fare should not be less than 5 cents. Speaking generally, where additional revenue is needed and the change from flat fare to a zone system is contemplated, the minimum fare for the zone system should not be less than the previous flat fare at least at the beginning. The increased number of passengers necessary to make up for revenue lost by reducing the fare to the short rider would, for the most part, ride on portions of routes already congested. Even if it were possible to obtain these riders by the reduced fare they could not be handled probably with present facilities in many communities.

In all cities using zone systems minimum fare riders constitute the larger percentage of revenue-producing passengers. On the Public Service Railway there was not a great increase in short riding when the fare was reduced from 5 cents to 3 cents, and, as a result, the company did not receive sufficient additional revenue from this source to make up for the loss from all of the riders who were able to avail themselves of a ride for a fare less than the previous flat rate of 7 cents.

It is true that the low fare zone system in use abroad has had no fair trial in this country, but experience thus far indicates plainly that under present conditions an initial rate under 5 cents would not bring a proportionate increase of short riders and would be ruinous, in that the fare of the long haul passenger would have to be increased to a prohibitive degree. Up to the present time, the zone system has been adopted because it was believed to be the preferable way, taking all needs into account, to secure the necessary additional revenue, and has in no case been tried out purely on its merits as being more equitable than the flat fare plan for producing the same revenue. There apparently has been no call on the part of the majority of the riding public in this country for a zone system except, knowing that increased fare had to be obtained, it was accepted as the less objectionable method. It is interesting to observe that, once having been tried out, it has remained in effect in all places where it has had a fair trial, and the prevailing opinion is that a large majority of the public, where such a system is used, would not change to a flat fare system producing equal revenue. The committee feels that in New Jersey and Connecticut the uniform rate zone system did not have a fair trial.

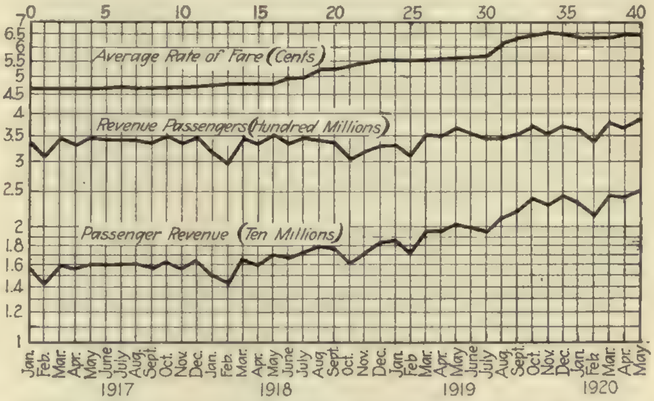


CHART SHOWING AVERAGE RATE OF FARE, REVENUE PASSENGERS AND PASSENGER REVENUE FROM GROUP OF FORTY COMPANIES, FORMING PART OF REPORT OF COMMITTEE ON FARES

All of the companies report practically no change as to congested areas or real estate values, due to the zone system. While true, this is not necessarily conclusive, because allowance must be made for the shortage in and unsettled conditions of housing facilities that have existed during the recent war adjustment period. The committee believes that this objection to a zone system has been very much magnified, and that it is not an important or valid one.

Against the protests made in the fare case at Springfield, Mass., by residents of suburban territory, that such territory had been built up under the flat fare system, and that the departure therefrom would be unjust and prejudicial to the inhabitants and especially to owners of real estate, the commission, in its decision, stated its belief that the zone plan would have no substantial influence on land values in the outlying districts. Even if it should, however, have such an effect, it was a fact that the electric railway lines had materially increased such values in the past; that the landowners profited by and enjoyed this unearned increment; and that, if they should be deprived of this in some slight measure by an attempt to apportion the mounting costs of electric railway service more nearly in accordance with the service furnished, there should be no complaint on this ground. The committee declares that this argument is logical and a fair answer to the protests of real estate promoters and suburban developers and landowners.

In some of the cities using a zone system no real jitney competition existed, but, in the majority of cases, jitney competition actually existing at that time, or fear of jitney competition with higher fares, was a very important feature in connection with the decision to introduce a zone system. Unquestionably the danger of jitney competition has been minimized by the adoption of a zone system instead of a corresponding increase in flat fares.

The managements now using zone systems investigated by the committee are practically unanimous that they prefer their present zone system to a flat fare system, and it is the opinion of the committee that in these places the companies are in a better position than they would have been under a flat fare system.

The committee has no changes to recommend in the terminology and definitions submitted in the report presented last year by the committee on zone systems.

The report also contained extended data on the results of the zone fare operation in certain cities as well as an appendix containing the replies to the questionnaire submitted by six companies. The report is signed by W. H. Sawyer, chairman; R. F. Carbutt, Thomas Conway, Jr., Robert M. Fuestel, L. R. Nash, L. H. Palmer, J. K. Punderford, A. S. Richey and C. L. S. Tingley.

DISCUSSION ON FARE SYSTEMS BY MR. MORTIMER

J. D. Mortimer submitted a prepared discussion on the report of the committee on fare systems, in which he stated that it was the consensus of experience that increases in flat rates of fare without change of fare points have pretty generally resulted in increases in revenue. If the area served for a single fare is large and the average ride long the increase in fare needed to compensate for increased costs has been larger than where the single fare area has been smaller and the length of average ride shorter. No one has yet been able to construct a demand curve for urban railway traffic. The relation between rates of fare and traffic is unknown. Attempts were made some years ago to show that the high riding habit in Cleveland was due to the 3-cent fare then obtaining, but investigation showed that the then high riding habit was accompanied by active business, disclosed by post office receipts, building permits and bank clearings. There was a much higher correlation between riding habit and business activity than there was between riding habit and rate of fare.

With the meager data available and the rough methods of reduction generally in use, it is impossible to say just what effect the rate of fare has on riding habit. It will probably vary in different localities; it will certainly vary during different seasons of the year, and it will vary with the industrial and commercial activity. Few cities during the last three and one-half years have possessed identical business characteristics. Some participated in war prosperity; others suffered because they had no war industry and temporarily lost population to the selective draft. If there is anything in the assumed relation between traffic and the rate of fare it is likely to appear more evident when war prosperity has become only a memory.

The diagram in the printed report shows that for the three years and five months the forty companies used in computing the comparative figures enjoyed an increase in traffic. The number of passengers during the first five months of 1920 was 1,843,000,000 compared with 1,667,000,000 during the first five months of 1917; this is an increase of 10.5 per cent. Just how much the traffic would have increased if there had been no fare increase no one will ever know. Neither will we know how much more traffic would have increased if the use of automobiles had remained constant during that period.

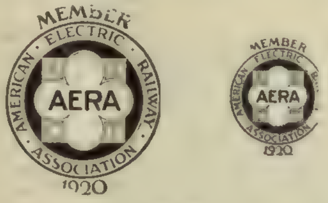
The fact that it became necessary to abandon the operation of the zone fare system on the lines of the Public Service Railway and the Connecticut Company is cause for great regret. Many people have been led to believe that these systems abandoned zone fares because they were impracticable; distance tariff plans thus received a setback. The central area zone system, devised in Milwaukee as early as 1911, but not placed in operation until January, 1914, appears to have given general satisfaction to both the company and the patrons. Needless to say, the central area zone scheme did not always produce the revenues which were expected; traffic reactions were indeterminate in quantity and accurate estimates difficult to make. In all the central area zone schemes except in Milwaukee zone fares were adopted for the purpose of increasing revenues at the time of adoption. In Milwaukee the plan was adopted to forestall an extension of the single fare area or central area in the near future and increase revenues in the more distant future. A look into the future was taken, and it was recognized that if expansion of the single fare area could be prevented, the problem of rising electric railway costs, then sensed, would be less difficult to meet. It was expected that the Milwaukee zone scheme would result in some reduction in revenues; an immediate small reduction was justified on the ground that in years to come the growth in revenues under this fare plan would far more than offset any temporary disturbance in income account.

That portion of the metropolitan system lying without the central area has never been remunerative; it has required support from the heavier traffic in the central area. But zone fares have not increased as rapidly as the increases in costs; the drag on the central area has increased. The commission and courts have held that the metropolitan system is to be considered as a whole and that the deficits on suburban lines are to be offset by larger returns in the central area. There remains much to be done in determining the best method of assessing the costs of service between the long and short haul rider. To require the long haul rider to pay all the costs of serving him will result in very high fares, fares so high as largely to reduce traffic. Probably only a general rule can be enunciated, *i.e.*, so to arrange the zone fares as to cause the minimum adverse reaction to traffic and support the deficit by the short haul traffic.

The problem is not greatly different from that of assessing income tax; ability to pay appears to be an important consideration. All the companies which have received increases in fares appear to be satisfied with the respective methods by which such increases were put into effect. The flat fare advocates are happy, and the zone fare proponents, who yet have their plans, seem satisfied with themselves. Probably most of us feel that revenues are still insufficient, and none of us, with possibly one exception, is very particular as to what scheme of fares gets us the money. If the railways are to run our motto must be, "Get the Money." Should industrial and commercial activity recede to the level where unemployment becomes noticeable and the depressed conditions of 1908 are approximated, then it will be instructive to watch the relative effect on earnings of the two general fare schemes discussed by the committee.

COMPANY MEMBERSHIP

The committee on company membership reported that its work this year had consisted of three parts: (1) The compilation of a list of possible members, based upon preliminary lists furnished by Secretary Burritt and revised according to data secured by correspondence and conference; (2) the enlisting of the active co-operation of railway men throughout the country in the endeavor to bring to the attention of companies which are outside the fold, as forcefully as possible, the advantages of membership in the association; (3) the use of all other possible means to secure the actual applications of possible members in time to have the names included in this report.



EMBLEMS RECOMMENDED BY COMPANY MEMBERSHIP COMMITTEE

The committee made several suggestions as to ways in which its work can be followed up. It submitted the accompanying design of an emblem for use of member companies on stationary, in catalogs and the like.

The committee reported a total of twenty-one new railway companies secured during the year.

The report was signed by F. R. Coates, chairman; Benjamin Adams, J. P. Barnes, H. F. Dicke, C. R. Ellicott, L. E. Gould, C. A. Hall, E. B. Moore, H. H. Norris, R. T. Sullivan, E. M. Walker, E. P. Waller and E. F. Wickwire.

PUBLICITY

The report on publicity explained that its instructions provided that the committee of publicity men, composed of local publicity men in the employ of a number of member companies, was to report to and work in close co-ordination with the committee on publicity. Such a co-ordination had been effected. The report mentioned the work done in disseminating the report of the Federal Electric Railways Commission and abstracts thereof and outlined a program for the coming year, including the preparation of car cards, the stimulation of utility managers to more consistent utilization of their employees as good will promoters, and the consideration of the publicity work of the various state associations, particularly that of the Illinois Committee on Public Utility Information, with a view of putting into effect such part of the work as can be adapted to the industry for use nationally.

OTHER PAPERS AND REPORTS

In the absence through illness of Gen. Guy E. Tripp, chairman of the Committee of One Hundred, President Pardee outlined the reasons for the formation of the committee, some of its accomplishments and stated that the executive committee of the association had voted for the future continuance of the committee for the purpose of further disseminating information pertaining to the industry.

The paper on possibilities of transporting other than passengers on interurban lines by Britton I. Budd, Chicago, was then read. It will be found on another page in this issue. Owing to the absence of Mr. Budd the paper was read by L. C. Carraway.

Martin Schreiber, Public Service Railway, Camden, N. J., then presented an address on the training of electric railway personnel. On account of the interest which this paper has to all branches of the electric railway industry its publication has been deferred to the next issue of this paper so that it can receive the wider circulation reached by the "mechanical issue" of this paper.

SETTLEMENT OF LABOR DISPUTES

At the conclusion of Mr. Schreiber's address President Pardee announced that Gov. Henry J. Allen of Kansas had arrived and would speak to the delegates on "Settlement of Labor Disputes in the Interest of the Public and its Influence on Fares."

A large audience had collected in the Greek Temple to hear Governor Allen, and eager listeners stood at the open windows. The Governor's address was devoted largely to an account of the working of the conciliation court in Kansas and the reasons which had led to its establishment. In the Governor's opinion a new principle in the settlement of labor disputes had been reached, beneficial alike to labor, capital and the public. His address was received with great applause. An abstract of it appears elsewhere in this week's issue. At its termination a vote of thanks was moved by Thomas N. McCarter and was unanimously carried by a standing vote.

Thursday's Session

The last session of the American Association was called to order about 10:30 a.m. Thursday, with President Pardee presiding. First in the order of business of the day was the report of the committee on valuation, which, in the absence of Chairman Kealy and Vice-Chairman Schreiber, was presented by Cecil F. Elmes, member of the committee. No action was taken on the report, an abstract of which follows:

VALUATION

The report of the committee on valuation was largely a reaffirmation of the principles outlined in the report of October, 1919, and an elaboration or a more specific definition of the significance of certain terms, such as "reproduction new," "present-day prices" and "going value."

The committee reported that it has spent its time in the study of important commission decisions and in the study and analysis of important papers which have been presented. It has also taken into consideration the fact that this is the fifth year of "abnormal prices" and that the general trend is still upward. It recommended the careful consideration of the reports of the committees on valuation and return of the Illinois State Electric Association, the Illinois Electric Railways Association and the Illinois Gas Association.

In making more clear what is meant by "cost of reproduction new" the committee says the following:

> It is one method used in making an appraisal and should not be confused with some other method.
>
> The "cost of reproduction new" of the physical plant, as we view it, means the estimated cost of reproducing a new property identical with the one under investigation, under

present conditions of labor and materials cost and methods of doing work without any deduction for loss of value due to age or other causes. The new property must be made up of the same number and kind of units as the existing property that is being reproduced, and all of the materials and labor that entered originally into the construction of these units must be considered in finding the reproduction cost of the new property.

As to present-day prices, the committee gave additional argument why unit prices of today must be used, for "in no way can the values of today be found by using unit prices of ten years ago, unless the dollar will purchase the same amount of material and labor today as it would have ten years ago. The company is clearly entitled to have the value of its property expressed in dollars having the same purchasing power as the dollars the public is paying for the service the company is compelled to give."

The committee also gave further argument with reference to "going value" and the reason for including it in a valuation. It states that "going value" is a fact just the same as the physical plant is a fact. Some of the more important items which take up "going value" are listed.

"Rate of return" is a subject directly collateral to that of valuation. The committee felt that it has not had time to give adequate attention to this question this year, but called attention to the paper on "Rate of Return" to be presented at the convention by C. F. Elmes, a member of the committee.

The report was signed by P. J. Kealy, chairman; Martin Schreiber, vice-chairman; H. C. Anderson, C. F. Elmes, Williston Fish, C. W. Gillespie, J. H. Hanna, W. J. Harvie, W. H. Sawyer and B. E. Tilton.

Following this report was the paper by Cecil F. Elmes of the firm of Sanderson & Porter on "Utility Regulation and Rate of Return," given in abstract in another part of this issue. On motion, the association gave a unanimous vote of thanks to Mr. Elmes for his paper.

MOTOR BUS PAPERS

Following Mr. Elmes's paper, three motor bus papers were presented. The first of these was "The Place of the Motor Bus in Urban Passenger Transportation" by George J. Shave, superintendent of maintenance, and Frank C. Pick, commercial manager, London General Omnibus Company, London, England. In the absence of both of the authors, the paper was read in abstract by Harold V. Bozell, editor ELECTRIC RAILWAY JOURNAL. It is printed in full in this issue of this paper. Considerable interest was expressed in favor of having this paper printed in full for the benefit of association members.

This paper was followed by one on "The Place of the Motor Bus as a Supplement to Electric Railways" by R. Gilman Smith, Milwaukee Electric Railway & Light Company, Milwaukee. This paper is abstracted elsewhere in this issue. A written discussion on this paper was submitted by J. D. Mortimer. It said, in part:

> We are prepared to admit the strong appeal of the pneumatic-tired vehicle operating at high speed with few stops. That some service can be rendered with a car seating four or six passengers needs no further proof. Whether such fares can be collected in competition with good street railway service as will make such business adequately remunerative has never been proved. The four and six passenger vehicle in "jitney" service does not seem to be permanent; the recession rate among operators suggests that something more than the usual monetary reward is necessary to keep an individual in such business. If there is any tendency, it is toward bus service seating sixteen to thirty or more passengers.
>
> The papers presented today deal with the larger type of vehicle. Mr. Smith, by a study of the comparative operating and investment costs, shows that both the motor bus and the electric car operating on rails have their respective places. The economical field of the motor bus is not nearly as extensive as the politicians and some of the bus operators have attempted to lead the public to believe.
>
> Probably the electric railway industry would be in better financial shape today if a reliable motor bus had made its appearance before the relatively large investment had been made in rail lines through sparsely settled urban and suburban districts. Then we probably would not be able to show how electric railways had built cities and increased taxable land values. But this heroic feeling is only satisfying for the time being. There is little permanent satisfaction in the knowledge that the sheriff is going to catch you sooner or later.
>
> Our cities are going to continue to grow. The same tendencies noted in all the recent census decades were recorded in the more rapid growth of the urban population during the period 1910 to 1920. Cities will continue to spread out and transportation facilities will be required to serve the new districts. Much growth will occur along lines of existing railways. But other territory will be built up requiring new facilities. Here is one place for the motor bus operated as an integral part of the city transportation plant. The motor bus will permit traffic to be developed to the point where the large investment in a rail line may be justified. The bus will thus conserve capital for more attractive uses.
>
> The cities that require motor buses as feeders or supplements to existing rail facilities are not numerous. Most cities are overbuilt with rail lines. Most cities could get better transportation if they had less track, and all cities could have better street car transportation if some of their track was in other places. Nevertheless, there are places where rail lines would ordinarily be built in response to "popular" demand, provided capital were available. In such locations the motor bus offers a solution of what may, for a time, be a pressing problem. The experience in Milwaukee and Kenosha will be watched with interest.
>
> If the motor bus has a part in the scheme of district transportation, then it is the duty of the railways to be the first to find its place and put it to beneficial use. Ill-advised competition may thus be anticipated and the better interests of the public more advantageously served.

Following this paper, George M. Graham, vice-president Pierce-Arrow Motor Car Company, Buffalo, N. Y., gave an address on "The Motor Vehicle—Competitor or Ally?" This address was most ably presented. By unanimous vote Mr. Graham was adjudged "Not Guilty." An abstract of Mr. Graham's remarks is given elsewhere in this issue.

There was no discussion on these papers except that Mr. Moser of the Fifth Avenue Coach Company, New York, said that he desired to correct a statement or impression given in Mr. Smith's paper, with reference to the experience of that company last winter. Mr. Moser said that at the time of the big storm his company, by means of a fleet of motor plows, opened the streets for normal operation by 6 a.m. of the day following the storm and that the chief difficulties encountered were caused by the snow thrown onto the streets from the sidewalks.

RECOMMENDATIONS OF THE PRESIDENT

This ended the program of the session and committee reports were next in order. The first was the report of the committee on recommendations in the president's address, presented by W. F. Ham, chairman. It indorsed the president's recommendations of an increase of the executive committee by the addition of six members, to be elected from the body at large, and the change in the membership class to provide for three additional classes of members, namely, (1) bankers, (2) investment organizations, and (3) consulting engineering firms. On motion the report was accepted and the administration was directed to take the steps necessary to put the recommendations into effect.

RESOLUTIONS PASSED

The next report was from the committee on resolutions and was presented by B. A. Hegeman, Jr. This report, given below, was unanimously accepted and approved.

Whereas a commission, appointed because in the opinion of the national government the crisis in the electric railway industry was seriously affecting the national interest, has reported to the President of the United States that electric railways constitute an "essential public utility," and that in their rehabilitation "the first essential is to restore credit," and

Whereas the present deplorable condition of the industry and its immediate restoration to full usefulness is a direct concern of the public, inasmuch as new capital in the amount of between $200,000,000 to $300,000,000 a year, not now obtainable, is required for extensions and betterments necessary to meeting urgent public requirements, and

Whereas such new capital will be forthcoming only if the reasonable requirements of the investor as to the safety of and return upon his investment be met, and

Whereas the readjustment in the relations between the public and the railways in order to effect this reassurance lies with the public authorities, state and local; therefore be it

Resolved, That the American Electric Railway Association, acting from a sense of public duty, calls to the attention of the nation the fact, as emphasized by the Federal Electric Railways Commission, that the restoration of electric railway credit is a requisite to the proper functioning of these utilities and urges with regulation of public utilities the application of such common sense economic and business principles as will restore credit and so enable electric railways to perform their full public service.

Whereas John H. Pardee has served this association as its president during the last two years, and under his wise direction it has increased to a remarkable degree in usefulness and value to its members and to the industry, generally, and

Whereas Mr. Pardee has devoted his time, energy and great talents to the association's interests and has placed all electric railways and all electric railway men under a not to be estimated obligation; therefore be it

Resolved, That the thanks of the association and its deep appreciation be extended to John H. Pardee, our retiring president.

Whereas since the association last met in annual convention death has claimed some of its most valuable and esteemed members; therefore be it

Resolved, That by this action the association expresses its sense of loss and its appreciation of the services rendered by its deceased members, both to the association and the industry.

Whereas the technical press has, as usual, been of great assistance to the association and has actively and effectively served the industry and the companies and individuals composing it; therefore be it

Resolved, That the thanks of this association be and hereby are extended to the ELECTRIC RAILWAY JOURNAL and to *Electric Traction*.

Whereas the officers, and especially the secretary, of the association have been indefatigable in their efforts in its behalf during the past year, and have done their work faithfully and well; therefore be it

Resolved, That the association hereby expresses its appreciation of their services and extends its thanks to them individually and collectively.

NOMINATIONS RECOMMENDED

The last report was from the committee on nominations, presented by Arthur W. Brady, president Union Traction Company of Indiana, chairman.

This report, in addition to making the usual nominations, made a recommendation as to a fixed nominating policy for the association and, itself, acted in accordance therewith. The report, which follows, was accepted and approved unanimously and the men who were nominated were unanimously elected to office for the ensuing year.

Your committee on nominations respectfully submits its report as follows:

For president for the ensuing year, Philip H. Gadsden, president Charleston Railway & Light Company.

In selecting Mr. Gadsden the committee was guided by its view that the principal work confronting the association during the coming year is of a very difficult and delicate nature. It is obvious from the developments of the war period, and is accentuated by the recent report of the Federal Electric Railways Commission, of which Mr. Gadsden was a member, that it is the immediate duty of the association to devote its efforts very largely to the cultivation of improved relations between the electric railway industry and the public. The committee regards Mr. Gadsden as eminently fitted for this task.

In this connection the committee takes occasion to recommend that in view of the great changes which, from year to year and almost from month to month, mark the critical period through which our industry is passing, it shall be regarded as the fixed policy of the association that, in the selection of all its officers, the association will be guided by the requirements at the time, unaffected by the choice of previous years.

Your committee nominates for vice-presidents the following:

First vice-president, Robert I. Todd, president Indianapolis Street Railway.

Second vice-president, P. J. Kealy, president Kansas City Railways.

Third vice-president, Britton I. Budd, president Metropolitan West Side Elevated Railway.

Fourth vice-president, C. D. Emmons, president United Railways & Electric Company of Baltimore.

The committee nominates as members of the executive committee representing manufacturer members the following:

D. B. Dean, sales manager J. G. Brill Company, Kuhlman plant.

B. A. Hegeman, Jr., president National Railway Appliance Company

J. R. Lovejoy, vice-president General Electric Company.

H. D. Shute, vice-president Westinghouse Electric & Manufacturing Company.

E. F. Wickwire, secretary Ohio Brass Company.

For members of the executive committee representing electric railway members, as authorized by action taken at this meeting, the committee recommends the following:

Frank R. Coates, president Toledo Railways & Light Company.

Frank Hedley, president Interborough Rapid Transit Company.

H. R. Mallison, assistant to president Montreal Tramways Company.

J. N. Shannahan, president Newport News & Hampton Railways, Gas & Electric Company.

W. H. Sawyer, president East St. Louis & Suburban Railway.

William Von Phul, president United Railroads of San Francisco.

As Mr. Gadsden had had to leave Wednesday evening, it was impossible to induct him into his new office, and the convention was pronounced adjourned by President Pardee.

Transportation & Traffic Association Proceedings

W. H. COLLINS
Retiring President

Six Topics Only Were Considered at the Atlantic City Convention, Namely, Collection and Registration of Fares, Traffic Principles, Safety Cars, Economics of Schedules, Freight and Express and Merchandising Transportation—R. P. Stevens Was Elected President

R. P. STEVENS
President-Elect

THE first session of the Transportation & Traffic Association was called to order by President Collins about 2:45 on Monday afternoon. The first order of business was the presentation of the president's address, of which an abstract follows:

PRESIDENT COLLINS ANALYZES YEAR'S WORK

"The electric railway industry is still facing a grave crisis. It has been confronted during the past year with more serious problems than ever before in its history. The conditions brought about by this situation have required the most intelligent and persistent efforts on the part of executives to meet and overcome. I believe, however, great progress is being made toward rehabilitating and stabilizing the industry, and I think we can now look toward the future with much greater confidence.

"Our association has accomplished much in the past, but I think it can be vastly more useful in the future if we can develop a greater spirit of enthusiasm and co-operation among the members, and I want to urge the importance of association work and the tremendous value it bears to the success of your properties.

"Last year a radical change was made from former practice in that instead of the presentation of a large number of subjects by standing and special committees only a few were covered, which gave ample time for a thorough discussion of each. This year the executive committee followed the same plan and six subjects were studied as follows: (1) Collection and Registration of Fares, (2) Code of Traffic Principles, (3) Safety Car Operation, (4) Economics and Schedules, (5) Express and Freight Traffic Facilities and Costs, (6) Merchandising Transportation.

"Of these subjects three were continued over from last year, namely, (1), (2) and (3).

"The problem of collecting and accounting for fares under a zone system has been the particular subject of one committee's investigation. The zone system is the object of general interest at the present time and offers the one best method thus far evolved of making the fare proportional to the distance traveled, and doubtless it would now be much more in vogue were it not for the difficulties of fare collection.

"After an extended and comprehensive study of the problem of traffic regulation in American cities a second committee has drafted a model form of traffic ordinance which it believes can be adapted, with some modifications to suit local peculiarities perhaps, to the requirements of any American city. The increasing congestion of traffic in city streets makes it of the first importance to us if we are to make any pretense of maintaining our schedules to see that the rights of the street car on city streets be carefully defined and strongly safeguarded.

"The committee on safety car operation in its study of this subject has prepared and sent out a comprehensive questionnaire covering practically every phase of safety car operation. The replies have been carefully analyzed by the committee and a summary of the conclusions derived from this analysis is incorporated in the report. The subject is of such timely interest just now that I am confident that the members of this association will derive considerable profit from a study of this committee's report.

"The study undertaken by the committee on economics of schedules gives promise of yielding a very valuable return. Among the subjects considered were: Analysis of schedules showing relation of dead time to live time, effect of increasing schedule speeds on platform expense, on investment, on traffic; methods of traffic checks to serve as basis of schedules. The traffic man and schedule maker, and the executive officer, too, for that matter, would find this report of immediate and practical value in his work.

"The possibilities of developing new sources of revenue by the transportation of express and freight is a subject which should command the interest of every operator who has the facilities for such business. Motor-truck operators have built up short haul business of this kind in the most unexpected places and there is no reason why the electric railways should not do the same. There can be no doubt that they can do the business much more cheaply than motor trucks. Just what it does cost the electric railways has been the object of this committee's investigation and its findings are given in its report. It is a subject which is very much to the point right now when the electric railways need to avail themselves of every possible source of income.

"Finally, merchandising transportation is a subject of the greatest timeliness. Every operating official knows that his business is not only to make transportation salable but also to sell it. The committee which has studied this subject this year has had the experience of the most efficiently operated properties in the country placed freely before it, and the committee has prepared in concise form a summary of the methods which experience has shown to be the most practical in developing the business of electric railways."

The reading of the report of the executive committee was omitted because it consisted principally of minutes of the meetings of the committee. The secretary's report was then read. It referred to the topics selected for discussion at the annual meeting and explained that the administrative expenses of the association were absorbed by the American Electric Railway Association.

President Collins then announced the appointment of the committee on resolutions: H. H. Norris, J. P. Barnes and G. K. Jeffries. The committee on nominations was then announced. It consisted of J. N. Shannahan, H. B. Flowers and F. W. Coen. At this point members of the Accountants' Association entered the hall to participate in the joint meeting to consider the report of the committee on collection and registration of fares.

COLLECTION AND REGISTRATION OF FARES

The joint committee of the Transportation & Traffic and Accountants' Associations on collection and registration of fares presented, first, names and definitions for the four types of zone systems (a, b, c and d) discussed in the 1919 report of the T. & T. Association and conforming with the practice of the zone committee of the American Association. These definitions, which were deemed necessary to avoid confusion in the questionnaire and to assist in standardizing nomenclature, follow:

(a) "Uniform Rate Zone System" is one in which the fare is directly proportional to the number of zones traveled in or through, that is, one in which the fare per zone is the same in each zone, including the first.

(b) "Initial Charge Zone System" is one in which the fare for the initial zone of any ride is greater than that for the succeeding zones.

(c) "Fixed Minimum Zone System" is one in which a certain rate per zone is charged, with a definite fixed minimum fare, which minimum disappears when the sum of the zone charges exceeds it.

(d) "Central Area Zone System" is one in which a flat fare or uniform charge, regardless of length of ride, within an established central area, is combined with zone charges on routes which extend beyond such central area.

A questionnaire was sent to thirty companies known to have given a trial to one of the four types of zone systems and eleven replies were received from companies which were able to speak from experience. These companies serve communities with populations varying from 20,000 to 1,250,000. The practice of several of these companies was described.

One company first discontinued transfers for crosstown riding and its revenues increased 2.7 per cent. It then established a zone area, 2.8 miles in radius, with a fare of 5 cents inside or outside for one zone ride and 8 cents for a ride to or from the center of the city beyond the zone limits. The operating revenue then increased 4.2 per cent over the previous year. Twelve days later the zone system was abandoned for a straight 7-cent fare, including crosstown riding and free transfers, and a 12 per cent increase was recorded. Another company is trying plan "d," and finds it successful, though it appears that as zone points are brought into the heavy traffic area the problem of passenger identification becomes more and more difficult. Another company speaks of the disadvantages of penny change and lack of a proper and simple method of fare collection, though it considers the zone system preferable to the single fare method if the latter is used with other than a 5-cent or a 10-cent fare. Another company has 5-cent zones, each divided into two sections to provide overlaps. It finds the system practicable even on open cars and with an overhead register. Another company has two zones with pay-as-you-enter inbound, those in the outer zones paying through receiving an identification check. When the zone limit is reached these checks are taken up. On the outbound trips the pay-as-you-leave system is used, the passengers who board the car in the outer zone receiving an identification check, so they do not have to pay the through fare when they leave the car.

The committee in its conclusions declares that under a zone plan identification checks are essential to prevent over-riding, but so far the committee has not been able to discover any satisfactory device for the issuance of such checks. Issue by the motorman or conductor is the only known method. The report concludes as follows:

"Analyzing all the reports received by your committee, we find that while several companies have been able to operate successfully under a zone system others have not been able to obtain satisfactory results with the type of zone system which they adopted and later the system was changed. Your committee is unable to say from the above analysis whether the difficulties experienced were due to local conditions solely or were inherent in the type of system applied. The principal difficulty appears to be that the details of application, so far as present zone systems are concerned, are burdensome both upon the public and the employee in carrying out the requirements without impairing the quality of service.

"It has been brought out that one of the chief advantages of a zone system is that it more nearly approaches the ideal condition for which all operating companies are striving, namely, that the fare collected be based on the transportation furnished the rider. Such a basis is of course fundamentally sound in principle and is equitable. All of the difficulties experienced and cited in the data furnished your committee are those of practical application, especially at points of congestion or heavy travel.

"In conclusion your committee desires to state that it is in full accord with the first above-mentioned fact and principle. With reference to the second condition stated above, your committee is forced to report, from the data available, that it is not able by analysis or otherwise to draw a constructive conclusion or to suggest a remedy for the practical difficulties which have developed.

"With respect to the application of a zone system to the one-man safety car, your committee recommends against its adoption except in small or sparsely settled communities, until some more simple system than any now in use is developed."

The report is signed by the committee, consisting of W. J. Harvie, chairman; M. W. Glover, co-chairman; R. D. Beatty, N. W. Bolen, L. D. Pellissier, E. C. Spring, C. W. Stocks, A. Swartz, W. A. Doty, John J. Duck, G. W. Kalweit, R. H. Stevenson and F. E. Webster.

Discussion on this report was not so complete or constructive as had been anticipated. Several points of interest were, however, touched on in the discussion which followed.

Ralph D. Hood, general manager Massachusetts Northeastern Street Railway, said he thought that the railway men were groping for light on this fare situation. Many systems had been tried and many discarded. He related the history of the Massachusetts Northeastern fare system, the advance from 5 cents to 6 cents, the change to shorter zones with a 5-cent unit, and subsequent change to 6 cents and then to 10 cents cash fare, with the present strip ticket selling at the rate of six for 50 cents. Mr. Hood said that this last system worked very well on his road: it has the advantage of a wholesale sale of rides; it makes the work in the first section somewhat harder for the conductor, but, on the other hand, the other zones are easier to handle. It is a good system where there are long rides and where there is extra riding from terminals. They have been able to find no specific case of resale of tickets. With respect to the effect of the increase in rates on riding, Mr. Hood said that while there was a 25 per cent reduction, he laid it entirely to the industrial condition of that section of the country over which the railway company of course had no control rather than to any change in fare. In reply to a question as to how he prevented conductors from substituting tickets for cash fares, Mr. Hood said that the amount of the cash fares was not more than 5 per cent of the total and that, frankly, he preferred to have the conductors get the advantage of the 1⅔ cents rather than to have them have the opportunity to take the entire 10 cents.

After Mr. Harvie had put a little catalyzer in the meeting, the discussion became a little more animated. John Benham of the International Fare Register Company said the manufacturers had always been trying to assist the railways to get all the nickels in the days of the 5-cent fare. When the fare system changed it became a serious problem to the manufacturer to make boxes which would register correctly and make it certain that the company was receiving all of the fares paid by passengers. It is not the mechanical or design difficulty, but rather the immense cost necessary to develop and change boxes to take care of changing fares. He related the history of reasons for locking up the pennies, such as the conductor substituting small nickels which would go through the penny register, thus making 4 cents per operation, and the subsequent development of the token, which immediately increased earnings beyond the rosiest expectations. While no longer in the fare box business, Mr. Benham commended the use of fare boxes and tokens as the one best method of assuring receipt of all money collected.

Mr. Benham also emphasized that city officials must help to make the fares simple. They are now agreeing that increased fares are necessary and they can be made to assist in making the fares simple and possible of collection. If zone fares are necessary, then Mr. Benham believes that plan No. 7 as reported by the committee is a desirable one. One of the most serious questions in this case or on the zone system in general is the question of over-riding, and that has by no means been solved. "Of course," said Mr. Benham, "I sell registers, but independent of that I believe that audible and visible registration of fares is necessary."

J. B. Stewart, Jr., general superintendent Youngstown (Ohio) Municipal Railway, said that under the service-at-cost franchise there the fare had been raised until finally on Jan. 1 it was 8 cents and on June 1 it was 9 cents. When the fare was 6 cents the conductors were substituting the smaller nickels through the penny register, but at 7 cents the tide turned and the public commenced to beat the conductor, particularly at heavy loading points. The first man of a large group, for instance, would board the car and ask for change for $1 and while the conductor was giving this change large numbers of others would go by and drop reduced fares or substitute tickets in the box. On May 1 the overhead register was installed and an immediate increase in revenue was noted. Pay-as-you-enter inbound and pay-as-you-leave outbound is the method of fare collection.

M. W. Glover, auditor West Penn Railways, called attention to the zone fare system section in the report of the Federal Electric Railways Commission, which, he said, he thought was very much to the point. Mr. Glover was a member of the joint committee, and in connection with the work of the committee said:

> One fact brought out by this report, in my opinion, is a question which may seriously affect the welfare of the American Electric Railway Association, namely, the apparent lack of interest shown by members of the association in replying to inquiries sent out by the association on subjects which vitally affect nearly every member company.
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> The members of this joint committee at considerable inconvenience to themselves held meetings and wrote numerous letters endeavoring to secure information to enable the committee to prepare a report which would be of some value to the associations. Forty-nine questionnaires were sent out and in addition letters were written several other companies asking for information on the subject of collection and registration of fares under the zone system and replies were received from only nineteen companies. Of these replies only eleven furnished information of such a nature as to be available for use. Upon taking the matter up with the secretary's office, I was surprised to learn that this percentage of replies received by this committee was above the average. It is indeed unfortunate that for some reason companies who take apparently an active interest in the welfare of the American Electric Railway Association are willing to ignore requests for information, yet the records of the secretary's office show that hundreds of requests for information are received at the association office from member companies on various subjects and some of the very companies which request information fail to reply to questionnaires sent out by the association.
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> I think this is a most important matter and that the future success or failure of the American Association depends upon the value of the information secured by it, and in turn furnished to its members, and I hope the executive committee of the Accounting and Transportation & Traffic Associations will bring this matter to the attention of the executive committee of the American Association in the hope that future requests will be given better attention.

Mr. Glover then confirmed his agreement with the report of the committee and said:

> It is reasonably certain that some workable method will be devised which will meet the requirements of electric railways and it is the duty of all operating and accounting men to give this matter thought, and when they have found a solution communicate the fact to other members of the association, as it is only by co-operation that we can expect to evolve a system which will prove equitable to the companies as well as to the traveling public.

L. H. Palmer, United Railways & Electric Company, Baltimore, said that the report of the fare systems committee must be read in conjunction with the report of this joint committee. The two reports really form one subject. Mr. Palmer said that he understood that there were still considerable over-riding difficulties in England, where the zone system is in extended use. This difficulty must be overcome to make the zone fare system really 100 per cent.

A. Swartz, Toledo Railways & Light Company, Toledo, said he thought the zone system is really coming on American railways. The matter of getting the money is the important thing. He related the Toledo experience of how, when they were operating on a 6-cent fare, they decided to get fare boxes, but before the fare boxes arrived they had changed to the paper tickets, which, by the way, immediately lost some revenue. Then a later change in fare, coupled with the use of boxes, increased the revenue again. When the token was used the revenue went up in a jump, and, so far as Toledo is concerned, he believes tokens and fare boxes to be the answer. Even with decreased riding, income went up when tokens and fare boxes were used. Another point is that the accounting work was reduced so much that he personally was sometimes half ashamed to take his salary for the work the accounting department had to do.

John Benham, who had been through the fare changes in Toledo and tried to furnish boxes to collect various kinds of fare pieces, said: "If you fellows will only get something uniform in the method of fares and decide upon what you want the manufacturers will give you something which will do the work."

Carl W. Stocks, ELECTRIC RAILWAY JOURNAL, said he believed the railways will try to find some sort of a standard zone scheme to apply in this country. Formerly all operation was on a standard 5-cent fare basis and everybody knew what it was all over the country. Now the railways will have to get back to some similar uniformity under changed conditions. He thought there was no doubt the 6-cent and other higher unit fares eliminated the short haul, and that, as electric railways were incorporated to carry the people, this made it more difficult to do that, and unless they do carry all the people possible they are not doing their duty. Mr. Stocks believed in the next five years we will see more zone systems in this country; in fact, that zone systems will increase rapidly.

At this point the Claims Association entered the hall for the joint Claims, Traffic & Transportation session.

Chairman H. B. Flowers presented the report of the committee appointed to draft a code of traffic principles.

CODE OF TRAFFIC PRINCIPLES

The formal report of the committee on code of traffic principles was devoted almost entirely to the proposed model form of traffic ordinance, which had been drafted by the committee during the early part of the year and had been offered by it as a suggestion at the convention in San Francisco, Aug. 23-27, of the National Traffic Officers' Association. In the report of this convention, published on pages 494 and 495 of the ELECTRIC RAILWAY JOURNAL for Sept. 11, 1920, an extended abstract of this proposed ordinance was published. The remainder of the report of the committee gave the reasons for the draft of such an ordinance and the principles on which it is based. The report pointed out that the advent of the motor vehicle in various forms has so enormously increased the congestion in city streets that an entire revision of the traffic ordinances in all large cities has become imperative. Furthermore, the report pointed out that studies of the traffic in downtown New York and to a lesser extent the congested districts in other large cities during the peak hours show that before long main artery traffic must be dispatched under a system which would permit of a movement of several blocks without stopping, that foot passengers must be forced to move with vehicular traffic, that speed regulation must take the form of a minimum rather than a maximum limit, and that in many cases left-hand turns must be eliminated. Such a change will meet with opposition from the individual who claims the right to drive a slow-moving vehicle, to stop where he pleases and to reach his destination by the shortest and most direct route, so that public support for a properly drawn ordinance can be secured only by public education. Persons who have a right to the use of the highways were divided into six general classes: (a) Abutting property owners; (b) pedestrians; (c) users of slow moving or heavy vehicles; (d) users of fast or medium-moving vehicles; (e) users of public conveyances, such as street cars and public buses; (f) those demanding emergency service, such as fire apparatus, police patrol, etc. The streets are too narrow to permit all of these parties to exercise their full rights at the same time, so that each must lose something of its individual freedom, the convenience of the few yielding to the convenience of the many, and the normal use yielding to the emergency use.

The report was submitted by the committee, consisting of H. B. Flowers, chairman; W. H. Maltbie, Fielder Sanders and P. E. Wilson.

W. C. Culkins, City Railroad Commissioner, Cincinnati, stated that he started out with an ideal ordinance that provided only one-way streets, eliminated parking of all vehicles and prohibited left-hand turns in congested areas. It was not possible to promulgate the original ordinance, for one-way streets enlarged the terminal districts, caused passengers to be disgruntled because they had to walk several blocks in some cases to reach their connecting route. Merchants in the original terminal districts also opposed this change in rerouting, saying that the elimination of two-way streets would cut realty values and cause them severe losses. The ordinance now in effect cuts parking time to a minimum, limits standing time of street cars to three minutes, prohibits vehicles unloading on streets except when there is no alley available and gives street cars the right-of-way between cross streets. At present consideration is being given to multiple berthing of cars and the elimination of automobiles between cars at such berthing points. An attempt is also to be made to prohibit taxicabs from cruising up and down the streets by the establishment of fixed taxi stands. For infractions of traffic rules Mr. Culkins recommended the more extensive use of the tag system, for it required a smaller number of traffic officers properly to enforce the regulation. Mr. Culkins also urged very strongly that the committee be continued so that the points of contact already established by Mr. Maltbie with the National Association of Traffic Officers and other traffic associations be preserved.

W. H. Maltbie of the committee spoke in detail of the criticisms to the committee's code made by the Traffic Officers' Association, an abstract of which was printed in our issue of Sept. 11, 1920, page 424. Mr. Maltbie asked that any constructive criticisms be forwarded to the committee for use at the coming meeting of the traffic officers' drafting committee, which will meet in Cleveland some time in November or December.

J. L. Wickes, Public Service Commissioner, Bureau of Transportation, Baltimore, stated that the Public Service Commission was endeavoring to aid the street railways of that city in every way in solving the street traffic problems. Personally, he had made a suggestion that when there are parallel streets, each with double street car tracks, they both be made one-way streets and that express and local street car service be established thereon. This suggestion is at present frowned upon by the officials of the United Company, but nevertheless he believes it will in a large measure help solve some of the problems if put into effect. Mr. Wickes is much in favor of doing all that is possible to speed up the surface cars, and also advocates the elimination of parking in downtown districts and the wholesale unloading of vehicles backed up to the curb, especially during peak-hour travel.

Both H. D. Briggs and R. E. McDougall stated that the claims men were heartily in favor of standardized traffic ordinances.

C. M. Talbert, Director Department of Streets and Sewers, St. Louis, stated that in his city the state had supervision over street traffic and that at present several congested arteries had been turned into one-way streets with some measure of success. He urged that all parties working on traffic codes take the fundamentals that had been agreed upon, which represent at least 90 per cent of the rules, and have the United States Bureau of Standards promulgate a code. Such a code would carry considerable weight and be of benefit to all kinds of street traffic.

D. F. Fennell, superintendent of transportation Kansas City Railways, speaking from his experience, urged the use of loading platforms and safety zones to facilitate the handling of vehicular traffic. Mr. Flowers, however, believed that such requirements should not be included in a traffic code, but should be a matter of agreement between the railway company and the supervisor of city traffic.

On motion by T. C. Cherry the report was approved and referred to the executive committee of the American Association for further action.

C. M. Talbert, St. Louis, then presented a paper on "Automobile Hazards," an abstract of which appears elsewhere in this issue, and spoke particularly of the work that had been accomplished in St. Louis in reducing traffic accidents. Mr. Talbert's paper caused much favorable comment and a committee, consisting of Messrs. Palmer, MacDougall and Cherry, was appointed to confer with him as to what the street railways could do to help decrease traffic accidents and report to the ensuing executive committee.

Tuesday's Session

A joint meeting of the Transportation & Traffic and the Engineering Association was held on Tuesday afternoon for the presentation of the report of the committee on safety car operation. This was presented by C. W. Kellogg, chairman, and an abstract of the report appears below.

SAFETY CAR OPERATION

Statistics obtained by the committee on safety car operation show that the number of safety cars purchased in 1920, including those to be delivered up to Oct. 1, 1920, is 3,750, compared with 1,100 for the same period in 1919. The total number of companies using safety cars on Oct. 1, 1920, was 340, compared with 130 on the same date in the previous year. Data from sixty-five companies operating safety cars, obtained by a questionnaire, are given in the report.

As to population served, four of these companies reported population in excess of 250,000, twenty-four less than 100,000 and eleven from 100,000 to 250,000, six not answering. The average number of such cars used during rush hour was 23 per cent greater than normal service, indicating that the cars carried the base load rather than the rush hour service. The weight of the cars varied from 13,000 to 20,000 lb., or 48.5 per cent of that of all the other cars on the respective systems. One-half the companies report no change in specifications of the standard Birney safety car, while minor changes have been adopted by others. The more important of these changes have to do with more seating capacity and more heat-resisting body construction in places where severe winter weather is encountered, the standard car having been developed for climatic conditions prevailing in the South.

The average energy consumption was 1.20 kw.-hr. per car-mile at the car, with 0.10 to 0.50 kw.-hr. per car-mile for heating and other auxiliaries.

Only one company out of fifty-two definitely reported dissatisfaction by trainmen with the cars. The average differential paid to operators of one-man cars over other trainmen is 4.24 cents, or about 10 per cent increase. This differential makes the job attractive to the men in spite of the increased duties, and this feeling of satisfaction does not seem to wear away with time. Most companies recruit the operators from the existing staff. About half of the companies in answering gave the opinion that the same qualities in trainmen were needed for the safety and for the two-man cars. The others felt that in a general way the younger, more alert men with conductor's experience made the best safety car operators.

Only two of fifty-one companies experienced any public opposition in the establishment of safety car operation, and at present, according to the answers, not a single case of state or city commission ruling against safety car operation exists, although in several cases operation of one-man cars without safety features is not permitted.

Out of fifty companies reporting schedules, twenty-five have made no change in headway with the use of safety cars. The others have made increases in frequency of from 10 per cent to 100 per cent, the average being 40.5 per cent. Schedule speeds were increased by ten of the forty-five companies answering this question. Twelve companies supplement safety car service with larger two-man cars on the peak and thirty-four companies do not.

The averages of the companies which increased their schedules with safety cars show 40.5 per cent increase in car-mileage, with a decrease in gross earnings per car-mile of only 0.93 per cent. That is, the gross earnings with safety cars show substantially the same per cent increase as the car-miles operated.

The practice in flagging railroad crossings varies greatly. On ten roads the operator leaves the car to flag crossings, while on nineteen roads the operator flags the crossings from his position without leaving the car. In a few cases regular flagmen are employed on account of legal requirements.

The vote on bearings was thirty to eight in favor of friction as compared with ball bearings for journals. No snow-fighting equipment had been found necessary by any company over that previously used with two-man operation. Air-operating sanders in winter were considered desirable, and the majority of the companies used overhead registers in addition to the fare box, which is universal.

From a recent study of a group of companies under one management, representing approximately 5,000,000 car-miles per year of safety cars and 7,300,000 car-miles per year of other cars, a saving of 53 per cent in safety car maintenance per car-mile compared with that of other types was reported. The returns of the companies reporting to the committee indicate materially reduced accident expenses per car-mile from the safety car. Forty-seven companies replied that their experience with the safety car had been such as to lead them to favor expanding its use on their systems, and only two answered to the contrary. The answers as to suggestions for improvement in safety cars tended to making the car sturdier in certain respects, a plan which the committee says is already being followed by the manufacturers.

The report on safety cars was signed by C. W. Kellogg, chairman; S. W. Greenland, J. K. Punderford, J. M. Bosenbury, J. C. Thirlwall, C. H. Beck and Gardner F. Wells.

Following the presentation of the report J. K. Punderford, the Connecticut Company, said that his property now has in operation 130 safety cars and thirty remodeled one-man cars.

The differential paid by the Connecticut Company to safety car operators, Mr. Punderford believes, is money well spent, as it is possible to obtain a better class of men and more efficient operators. No boarding or alighting accidents have occurred with safety cars. The Connecticut Company uses fare boxes without double registration. The latter is favored, but it is believed that this would add too many duties.

H. B. Flowers, United Railways & Electric Company, Baltimore, said that his company has now in operation thirty-three safety cars and twelve converted one-man cars. The results of safety car operation have been a little disappointing, as the expected increase in traffic was not obtained. A differential of 5 cents in wages is paid, and the public took very well to the car. Mr. Flowers said that it was inadvisable to conduct an extensive publicity campaign prior to inauguration of safety car service, as this acted as an apology for the car.

D. L. Fennell, Kansas City Railways, stated that fifteen safety cars were placed in operation on that property in April, 1919. Due to the preceding strike all men had had not over two months of railway experience. The cars were put in service on a six-minute base and a three-minute rush headway. This has since been reduced to a five-minute base and a two-minute rush headway. Street collectors are used in congested districts and prove very helpful. This method of collection, however, was used prior to the inauguration of safety car service. Kansas City now has ninety-five safety cars in operation. Mention was made by J. M. Bosenbury, Illinois Traction System, of one property on which an increase of 25 per cent in car-miles had caused an increase of 33⅓ per cent in revenue. This resulted in a change from $1,000 deficit to $8,000 net revenue.

S. W. Greenland, Fort Wayne, Ind., said that his property did not have the standard Birney car, but that the average weight of his equipment was 18,500 lb. The operators receive 2 cents an hour higher wages than the interurban men. Fort Wayne has 100 per cent one-man service.

No safety cars have yet been placed in service in Chicago, said H. H. Adams of the Chicago Surface Lines, although ten standard cars have been ordered. Mr. Adams is making an extensive study of the safety car problem from a standpoint of car design for semi-congested service. This includes a study of the possibility of a separate exit and entrance and some method to safeguard the exit to make impossible its use in boarding. Mr. Adams believes that the present car is not quite ample in dimensions for outlying crosstown lines. Any large city has locations where the safety car can be used successfully. Mr. Adams asked that the railway operators present discuss any weaknesses which had developed in the car body and the necessity for the manufacturers to design a new motor. The present 25-hp. motor is not guaranteed for service on a car weighing over 16,000 lb., and the changes which Mr. Adams has in mind will increase this weight to 18,000 or 19,000 lb. It is believed that a car 8 ft. 4 in. or 8 ft. 6 in. in width and longer than the present car could be used. A proposed design gives an additional 16 in. in length and provides thirty-seven seats in place of the present thirty-two. It was pointed out that any decrease in maintenance resulting from the use of safety cars depends upon the age of the equipment replaced. The question of armature clearance was also raised.

R. B. Stearns, Eastern Massachusetts Street Railway, said that his company had purchased 250 new one-man cars and expected 100 more within a month. It is also remodeling the older cars at the rate of about forty per week for one-man operation. These are giving entire satisfaction. A couple of years ago the company had 2,345 passenger cars and of these 649 were scrapped last year and 738 this year. With the exception of about 100 cars, which are needed for train and other special operation, the property will soon be operated exclusively with one-man cars.

The company found that while under state supervision it is possible to raise fares, it is nevertheless necessary to save money, and one-man operation promised much in this direction. Mr. Stearns estimated a saving of about $3,000 per year per car on a 30,000-mile basis, with car-for-car replacement. The company had tried some experiments with single versus double folding doors and had decided on the former as better, although a door width somewhat greater than the minimum possible was preferred. Another experiment related to the lengthening of old single trucks, which was not found satisfactory. Their use showed the need of resilience.

As to maintenance of the one-man cars, Mr. Stearns felt that it is too early to reach a conclusion, but he felt that it might prove true that equipment and track maintenance varied somewhat with the weight of the car. His company is investing $4,000,000 in rolling-stock equipment to save $1,000,000 annually.

J. C. Thirlwall, General Electric Company, said that judging by recent results, one-man operation is going to be greatly extended both with standard and remodeled cars. It is quite possible to operate cars larger than standard by one man. Mr. Thirlwall quoted data secured in co-operation with the ELECTRIC RAILWAY JOURNAL showing operating results on a number of properties. From partial statistics it appears that the increase in gross earnings is about 90 per cent of the increase in service, while maintenance costs are cut roughly in two. Following Mr. Thirlwall, K. S. Schluss, Tacoma Railway & Power Company, said that, based on experience with thirty-two cars installed in 1917 and twenty-nine more installed in 1918, he considers the bodies amply strong, particularly in view of the war-time service to which they were subjected. For six months ended August, 1920, he had found about 1.3 cents per car-mile to be the average maintenance cost. E. M. Walker, Terre Haute Traction & Light Company, put in a plea for the standard car and said that the motor and compressor capacities of the cars used in his city are ample. The air equipment operates about 40 per cent of the time, and the motors have reserve capacity. The energy consumption for propulsion alone is less than 1 kw.-hr. per car-mile, the total being 1.1 kw.-hr. in summer and 1.5 kw.-hr. in winter. With 95 per cent of the rolling stock of the safety type, twenty months of operation to Aug. 1, 1920, showed that the safety cars produced 70 per cent of the gross income and 99½ per cent of the net income, while they are responsible for but 50 per cent of the operating costs.

The discussion was closed by C. H. Beck, Westinghouse Traction Brake Company, who called attention to the difference in the tenor of the discussion as compared with the 1919 meeting. Then it related to economics, now to details of design. Assuming that the safety car mileage in this country is 380,000 per day, the passengers carried total 2,000,000. At least $8,000,000 is saved per year by the safety cars. He urged managers not to forget why they put the safety cars in, but to extend their use to secure the maximum benefit.

Following Mr. Beck, H. B. Flowers moved that the report of the committee be accepted and the committee continued and this motion was passed. The meeting then adjourned, the engineers gathering in their own hall to discuss the subject of the keeping of stores.

Wednesday's Session

The session of the Transportation & Traffic Association on Wednesday afternoon was devoted to a discussion of the report of the committee on economics of schedules. An abstract of this report, which was read at the meeting by Alexander Jackson, follows:

ECONOMICS OF SCHEDULES

The subjects considered by the committee follow:

1. Analysis of schedules showing relation of dead time to live time.

2. Effect of increasing schedule speeds, on platform expense, on investment, on traffic.

3. Methods of traffic checks to serve as basis of schedules.

In connection with subject 1, the committee presented as a standard analysis of car-hours and crew-hours and for discussion the following division into the various factors now known to exist:

ANALYSIS OF CAR-HOURS

Revenue Passenger Cars.

1. Actual time operating to or from carhouse to starting point, known as "pull-in" or "pull-out" time, "run-on" or "run-off" time, dark or inactive hours, idle time or dead time.

2. Time operating between terminals including time allowed at stops; that is, running time.

3. Time allowed on the schedule for layover of car at terminals between trips, called allowed time, slack or layover time.

4. Time actually consumed out of No. 3 in operating between terminals, including time at stops; that is, running time plus delayed time.

5. Time consumed beyond time allowed in No. 3, commonly known as "set-back," "fill-in," "turn-back" time.

It is necessary to divide car-hours for revenue cars into the above various factors in order properly to define trip speed, schedule speed or actual speed.

It is understood that special or chartered cars, or funeral cars, or other passenger-paying cars will be included as revenue passenger cars.

Miscellaneous Revenue Cars.

The same method of computation would apply for sprinkler cars, mail cars, freight cars and express cars.

Non-Revenue Cars.

Non-revenue cars include supply cars, shifting cars, rail cars, wreck cars, pay cars, line cars, snowplows or sweepers, sand cars, sleet cars, dump cars, coal cars, bonding cars, slot scraper cars.

ANALYSIS OF CREW-HOURS

Revenue Passenger Cars.

1. "Reporting time" is time allowed in preparing car for service or putting car away after service.

2. "Platform time" is actual time operating trips including time between trips allowed on the schedule as layover time.

3. "Time allowance" is time in addition to platform time allowed to bring run to a prescribed number of hours.

4. "Spread allowance time" is time allowed because of length of spread or over-all time to work a given (scheduled) run.

5. "Minimum or guaranteed time" is the amount of time allowed to bring time of extra men up to a prescribed number of hours per day or per week.

6. "Over-time" is time worked by men in excess of their regular run.

7. "Continuous time" is time allowed between the completion of a regular run and time reporting for extra work. This also covers all swings for which crews are paid.

EFFECT OF INCREASING SCHEDULE SPEEDS

The committee assigned this subject to Alexander Jackson to formulate a brief statement showing the effect of increasing the schedule speed as requested to form the basis of a discussion. It is considered under three heads as follows, (a) On platform service. (b) On investment. (c) On traffic. An abstract of the discussion by Mr. Jackson, who is superintendent of time-tables Public Service Railway Company, Newark, follows:

(a) The effect on platform expense is very pronounced. On a line operating a speed of 8 m.p.h. at a wage scale of 60 cents per hour per man, or $1.20 per hour per crew, the cost is 15 cents per car-mile.

If the schedule speed could be increased to 9 m.p.h. a saving of 1⅔ cents per car-mile could be made in platform cost, and if increased to 10 m.p.h. a saving of 3 cents per car-mile would result. If an increase in wages was made to trainmen making the rate 65 cents per hour per man, or $1.30 per hour per crew, it would only be necessary to raise the schedule speed to about 8.7 m.p.h. to absorb the increase and keep the car-mile rate constant.

(b) The effect on investment is so far reaching it is difficult to arrive at the exact amount. The following estimate on the amount required per car is thought conservative:

Cost of car	$15,000
Car house and shops	2,500
Power house investment	10,000
	$27,500
Yearly interest at 8 per cent	2,200

The power house figures are based on the following: Investment of generating station at $125 per kw.; transmission and substation at $75 per kw., total $200 per kw.; 50 kw. will be required per car *i.e.,* $200 multiplied by 50 kw. = $10,000 per car.

(c) Effect on traffic: The principal effect on traffic is that increasing speed reduces the number of cars in any given area at a given time, to give the same service. This reduces congestion, with a consequent increase in regularity. From the passenger's point of view, higher speed means a quicker trip, and speed is an important factor to be taken into consideration with jitney competition.

For example, assume a property operating 100,000 car-miles per day at a speed of 8.50 m.p.h. consuming 11,765 car-hours. The speed is increased 10 per cent to 9.35 m.h.p., then to operate 100,000 car-miles 10,695 car-hours would be used, making a daily saving of 1,070 car-hours.

If we assume the average car use per day as fourteen hours, under the old speed 840 cars would be used, while the new speed would require 764 cars, saving seventy-six cars. This may be summarized as above.

Estimated saving in investment 76 cars at $27,500 each	$2,090,000	
Saving in interest at 8 per cent		$167,200
Saving in platform expense at $1.20 per car-hour $1,284 per day—$1,284 by 350 average days		449,400
Saving per year		$616,600

METHODS OF TRAFFIC CHECKS TO SERVE AS BASIS OF SCHEDULE

The committee finds that in the past this subject has received very careful consideration and many data are now available. The following facts were contributed on this subject by Joseph A. Stoll, traffic manager United Railways & Electric Company of Baltimore, Md.

A traffic department that is alive and efficient will save many thousands of miles in a year that otherwise would be run needlessly and will anticipate and forestall complaints through close analysis of traffic checks and prompt adjustment of schedules. Proper statistics are indispensable to the intelligent handling of the many traffic problems that are constantly arising. Results depend, of course, more upon the quality than upon the quantity of statistics. Undoubtedly the most effectual results are obtained from simple records that faithfully and clearly portray actual traffic conditions.

A very satisfactory method to pursue in the acquisition of traffic data is as follows: After a list of checking points is selected, preferably at compulsory stops, and at points which should be agreed upon by the commission's representative or other regulatory authority, a checking schedule should be prepared in such a manner as to include all the lines of the system. The more important lines should be checked regularly and frequently and those of less importance as often as considered advisable. There should also be one or two extra men assigned to do special work, such as making running time tests, on and off characteristic curves, etc. Furthermore, there should be a supervisor of checkers.

The checking schedule should be arranged to cover a.m. and p.m. rush hours; mid-day and night rush-hours, and Saturdays and Sundays. Each checker should be supplied with a copy of his working schedule, a list of seating capacities of the cars, and such other general information as will aid him in his work. The checkers should be equipped with good watches and the watches should be synchronized with the official clock. A form similar to that submitted by the 1915 committee has proved very satisfactory. Upon this slip should be entered the train (or block) number, arriving time (nearest half minute) and total passengers. Where the checking is done at a transfer point the inclusion or exclusion of interchange traffic should be predetermined.

The slips should be added by the checkers, or observers as they are sometimes called, in half hour subdivisions. The checks should be turned in each day and after they are audited a typewritten record made of the half hourly results. This record presents clearly the service furnished and demanded during each period of the day and when compiled for a series of days will show adequacy of service and how closely the schedule was adhered to on the days checked.

Periodically there should be continuous all-day checks made and the results tabulated in half-hourly periods and charted. A series of such charts will reflect good or bad progress in the application of schedules.

The traffic department should also study the possibilities of short line service so as to obtain both maximum use of available equipment and better distribution of the passenger load. For this purpose it is desirable to have counts made of passengers boarding and alighting at all stops and the data so obtained for a number of trips under typical conditions reduced to a curve, generally known as a "characteristic" or "on and off" curve.

Proper running time must also be determined from observations and stop-watch tests made under the supervision of a competent transportation man. The United Railways of Baltimore has found it both feasible and advantageous to vary the running time in accordance with the degree of ease with which the cars may be "gotten through" at different hours of the day. Another very useful chart graphically depicts the loading of individual cars, average loading and spacing. The report was submitted by Edward Dana, chairman; James P. Barnes, H. F. Fritch, Herman E. Hicks, Alexander Jackson and J. A. Stoll

J. V. Sullivan, assistant to president, Chicago Surface Lines, in discussing the report, said he was impressed with the moderation of the committee in listing the kinds of times for which the company has to pay. He then read a list of some eleven times other than "running time," which are paid for in Chicago, and said that they aggregated 19 per cent of the entire time. He said the advantages of having definitions for different kinds of time would be great.

John J. Duck, general auditor of the same company, said that it would be desirable to have the records supplied to the management worked out on the basis of both platform time and total running time. In this way it would be possible to determine exactly what the cars were earning. J. E. Duffy, general superintendent, New York State Railways, Syracuse, also expressed pleasure over the outlook for accepted definitions of different kinds of time. He also pointed out that statistics on miles per hour would be confusing unless there was acceptance of such definitions. H. E. Hicks, superintendent of schedules, New York State Railways, Rochester, a member of the committee, explained that the definitions given in the report were not intended to be inclusive of all kinds of time and that with each new labor contract new kinds of time for which companies had to pay were possible.

H. B. Flowers, general manager United Railways & Electric Co., Baltimore, thought that schedule speed should be changed during the day more often than is frequently the case in order to increase the average speed. He thought a gain could especially be secured by increasing the schedule speed of the cars going in the opposite direction from the main flow of traffic.

D. L. Fennell, superintendent of transportation Kansas City Railways, suggested standardization of methods of schedule making, as for example, the method of figuring spreads.

N. W. Bolen, superintendent Public Service Railway, Newark, explained that that company kept separate records of its revenue and non-revenue car mileage. In connection with the point raised by Mr. Flowers, he asked whether it was better to have the car crews change their running time at a certain hour on the route or at terminals.

Herbert C. Moser, superintendent of transportation Fifth Avenue Coach Company, explained that that company changed its running time by the clock, that is to say, when a bus reached the next time point after the time at which the change was to be made. He believed that companies should have a much larger number of running times during the day. Some companies had only three, i.e., from 7 a.m. to 7 p.m., from 7 p.m. to midnight, and from midnight to 7 a.m. Inspectors and dispatchers do not like many changes in running time, as it is inconvenient to them, but it is a step in economy. Running times between time points should also be figured out in the timetable department rather than left to inspectors. He said there was danger also that absolute stops should be continued when the reasons for them had disappeared. A company should constantly be revising its absolute stop marks and making running time checks. It is sometimes helpful also to place the time points farther apart when a company is endeavoring to increase the scheduled speed. Timetables should not be put in the same class as dining room tables and expected to last for fifteen years. His suggestion was constantly to keep checking.

Discussion then turned upon the definition given in the report of the committee on "Analysis of Car-Hours" and "Analysis of Crew-Hours." In this connection William B. Wheeler, superintendent of timetables, Third Avenue Railway, suggested the elimination of the expression "dark hours" in the first definition, as he believes it an inheritance from the old cable cars in New York and not used to any extent outside of that city, and, in the same definition, C. E. Morgan, Brooklyn Surface Lines, said that the term "pull in" was generally used in connection with a defective car and was different from "run on" and "run off."

At this point F. G. Buffe, general manager Kansas City Railways, declared that there was a great call in this country for good schedule makers and that the companies would do well to instruct and break in new men for this kind of work.

Mr. Moser suggested that half a dozen proposed schedules be prepared and be presented for discussion and definite conclusions either at the meeting next year or at the mid-winter meeting. Mr. Jackson explained that the report was not a list of set definitions but was recorded for the purpose of bringing out criticism so as to arrive at a proper name for each item. Mr. Fennell suggested that the committee send out a questionnaire to the member companies for criticism as to the method of preparing the data. He emphasized the need for standardization of definitions. At the suggestion of Mr. Bolen it was voted to appoint a joint committee of the Accountants' and the Transportation & Traffic Associations to carry on the work on schedules.

Following the discussion of the report of the committee on "Economics of Schedules" the session was continued jointly with the Engineering Association and an address on the super-power plan was presented by W. S. Murray, chairman super-power survey, United States Geological Survey. This address which is abstracted elsewhere in this issue explained the work and plans of the survey and what it was expected to accomplish.

Before adjournment a three-reel motion picture showing track construction methods in Cleveland was presented by C. H. Clark, engineer maintenance of way of that property. This film illustrated the pavement plow in action tearing up 1,200 ft. of pavement in three minutes. Cutting rails with the acetylene torch, breaking pavement with a pile driver, and electric riveting and welding of joints were also illustrated. The film showed the electric crane, electric shovel and gantry crane in action.

Thursday's Session

President Collins presided at the final session of the Transportation & Traffic Association Thursday afternoon. The report of the committee on express and freight traffic was presented by T. H. Stoffel, in the absence of P. P. Crafts, chairman. This was followed by the report of the committee on merchandising transportation, which was read by F. G. Buffe, chairman. Abstracts of both of these reports appear on the following pages.

EXPRESS AND FREIGHT TRAFFIC FACILITIES AND COSTS

Information received from the questionnaire of the committee indicates that many electric railway companies do not segregate their costs of handling freight from their other operating expenses, and where the separation is made the methods of accounting vary considerably. General figures for the nine roads reporting are given in Table I. The larger gross earnings shown by the western roads reflect their greater development of the freight business and larger hauls. The greater revenue of the Western roads per car-mile is undoubtedly due to the heavier loading per car in the west.

In connection with Table II, Table III is also included, showing energy consumption and costs per car-mile for operating freight cars, both motor and trail, as determined by actual meter tests extending over distances of from 1,500 to 10,000 miles, the cost of power at the trolley being on basis of 2.92 cents per kilowatt-hour. The cars used varied in length from 38 to 50 feet and in capacity from 20 to 40 tons.

The increased power consumption indicated by these figures for the second and third trailers is undoubtedly due to the fact that the point of maximum efficiency of the motors used was past, or there may have been a reduction in line voltage due to the greater load. Generally speaking, however, trail cars in freight service require but 20 per cent of the power necessary to operate motor cars; in other words, a motor freight car with proper electrical equipment can haul five trailers at a power cost for operating two motor cars. This but emphasizes the economies to be secured through trailer operation in freight service.

TABLE I—GROSS EARNINGS AND REVENUE OF NINE ROADS

Road No.	Gross Earnings	Freight Car Miles Operated	Total Tons Handled	Tons per Car-Mile	Revenue per Ton	Revenue per Car Mile
Eastern Group:						
1	$99,681	266,755	65,000	0.244	$2.44	$0.37
2	649,967	678,877	373,073	0.550	1.74	.96
3	132,541	175,423	50,943	0.290	2.60	.76
4	264,681	400,836	110,036	0.276	*2.40	.66
Average*...	$286,718	380,473	149,763	0.340	$2.29	$0.69
Western Group:						
5	$265,842	311,352	48,060	0.155	$5.52	$0.85
6	1,514,238	1,323,925	299,363	0.227	4.97	1.14
7	100,476	82,000	17,112	0.209	5.78	1.23
8	428,184	†	116,455	†	3.68	†
9	511,162	900,841	113,039	0.114	4.52	0.52
Average*..	$563,980	677,030	118,805	0.176	$4.89	$0.94

* Average not weighted. † Figures not available.

Expense of trainmen is the highest item in the cost of electric freight operation, and this also emphasizes the desirability of trains.

The next largest item is the labor cost of handling freight at stations and terminals, and where terminals are adequate in size and sufficient rolling stock is available this expense can be considerably reduced. Another help is the provision of adequate team trucks where carload and less than carload freight may be loaded directly from the trucks into freight cars. This may be done with many classes of freight which do not require weighing or where weight agreements are in effect. An expense of from 1 to 2 per cent of revenue for loss and damage is not excessive.

The average total expense for the group being made up of only a small number of roads, especially in the Western group, is probably not representative.

TABLE II—UNWEIGHTED AVERAGE EXPENSES OF SPECIFIED NUMBER OF EASTERN AND WESTERN GROUPS OF LINES

	Expense per Car-Mile		Expense per Ton	
	Four Eastern Roads	Three Western Roads	Four Eastern Roads	Four Western Roads
Maintenance of way	$0.0519	$0.0535	$0.162	$0.390
Maintenance of equipment	.0355	.0415	.112	.284
Power	0518	.0490	.157	.401
Train labor	.1851	.1587	.575	.791
Station	.1332	.1604	.406	.839
Other station expenses	0215	.0137	.195	.063
Loss and damages	.0105	.0286	.013	.167
Miscellaneous transportation expense	* .0094	* .0354	* .009	* .508
Traffic	.0049	.0119	.024	.039
General and miscellaneous	.0692	.0538	.145	.381
Total	$0 5680	$0 5928	$1 748	$3 462

* Averages of two roads only.

TABLE III—ENERGY REQUIREMENTS AS STATED BY TESTS

	Average Kw.-Hr. per Car-Mile	Cost of Power per Car-Mile per Train	Separated Cost of Power per Car-Mile for Each Trailer
Single motor car	2.80	$.0819	....
Motor car and one trailer	3.40	.0994	For first trailer 0.0175.
Motor car and two trailers	4.12	.1205	For second trailer 0.0225
Motor car and three trailers	5.00	.1463	For third trailer 0.0244.

It is generally admitted that outside of the lack of equipment, the greatest need of electric lines engaged in freight handling is terminal facilities, and as a rule, far more business is being offered such lines daily than they are able to take care of, with the result that it becomes necessary to issue frequent embargoes, with consequent loss in revenue.

Studies of steam railroad less carload freight terminals indicate that where a terminal loads twenty cars of freight per day there should be track standing room for the same number of cars per day, and the average area required for one-story, single-deck freight terminals, including driveways, tracks and buildings, is approximately 2,000 sq.ft. per car. In many instances electric roads are loading daily two or three times the number of cars they have standing room for.

TABLE IV—PRINCIPAL TERMINAL FACILITIES

Road No.	Total Area in Square Feet	Area Occupied by Building	Cars Standing Capacity	Number of Cars Using Terminal per Day	Square Feet per Daily Car Standing Capacity	Square Feet per Cars Using Terminal Daily	Total Yearly Tonnage Inbound	Total Yearly Tonnage Outbound	Average Loading per Car in Tons Inbound	Average Loading per Car in Tons Outbound
1	16,890	7,425	5	18	3,630	938	20,000	45,000	4	8
2	*	*	*	*	*	*	*	*	*	*
3	3,781	*	10	7	378	540	31,22	10,312	3	8
4	92,597	10,080	10	11	9,260	8,418	142,91	23,111	5	8
5	44,584	23,640	20	22	2,229	2,027	289,50	41,884	18	29
6	150,880	44,440	67	100	2,252	1,509	†2751,85		7½	7½
7	8,850	3,600	4	6	2,213	1,308	31,32	6,836	1+	4+
8	196,150	12,030	32	20	6,129	9,807	134,44	60,098	*	*
9	*	4,000	10	12	*	*	11,40	1,502	10	10

* No figures received † Includes both inbound and outbound

The conclusions of the committee follow:

1. There is a great and profitable field for electric railways in handling freight.

2. To handle freight with a profit it is necessary to provide adequate facilities, including ample equipment and well planned terminals.

3. Every effort should be made to handle freight in trains consisting of a motor car or electric locomotive, depending on the class of business handled, and as many trailers as may be practicable, in order to reduce (a) investment in equipment, (b) trainmen's expense, (c) cost of power.

TABLE V—HANDLING COST PER TON AT PRINCIPAL TERMINAL FOR EIGHT ROADS

Road No.	Warehouse truckers	Warehouse foremen and checkers	Agent, cashier and clerical force	Station heating, lighting, etc.	Total	Wages Paid Warehousemen
1	....	.....	.....	.....	$0.27	$105 to $125 per month.
2	No data	.....	.....	.....	....	
3	0.257	0.104	0.156	0.105	.622	42 and 43 cents per hour.
4	....	.....	.....	.....	.....	41 cents per hour.
5	.73	0.11	.22	0.005	1.065	Foremen and checkers $125 to $140 per month; truckers 50 cents per hour.
6	.80	.....	.....	.....	.80	49 to 53 cents per hour.
7	....	0.48	0.48	....	.96	50 to 55 cents per hour.
8	0.196	0.21	0.168	....	.574	Truckers, 30 to 33 cents per hour; foremen $85 to $105 per month.
9	....	.....	.....	.....	.....	All on monthly basis, $85 to $100 per month

4. Every effort should be made tending to the heavier loading of cars.

5. It is evident that the accounting methods used on the majority of roads are not such at this time as to permit of definite determination of the cost of handling freight.

In conclusion, the committee recommended a thorough investigation of the cost of handling freight business similar to that worked out by F. W. Doolittle in 1916 for passenger traffic.

The report is signed by the committee, consisting of P. P. Crafts, chairman; T. H. Stoffel, vice-chairman; J. H. Crall, E. W. Fowler, R. B. Hull, F. D. Norviel, W. S. Rodger, C. E. Thompson and H. B. Titcomb.

MERCHANDISING TRANSPORTATION

An extended report was presented by the committee on this subject and was devoted to methods whereby the service to be sold could be made more attractive, to the education of employees in the capacity of salesmen, to advertising through different mediums to attract business, to the help possible from public and civic bodies, and to the advantages offered by the widespread use of tickets. The report pointed out that formerly the idea of using merchandising methods to dispose of rides never occurred to railway managers, but now salesmanship is necessary. Not only is there competition from privately owned and public automobiles, but increased fares have developed another very likely competitor, *i.e.*, the sidewalk, although it is a relief to know that the public is now beginning to think of rides in terms of service and cost and that in spite of higher fares riding has increased. The report was accompanied by reproductions of selected publicity. Several of these are reproduced. The following summary of the methods of merchandising transportation is from the report:

DIRECT METHODS OF MERCHANDISING TRANSPORTATION

Advertising: The electric transportation industry must advertise its service and use the copy plan to overcome the effects of competition and induce more car riding.

Of all the advertising mediums the daily newspaper is probably the best.

Another excellent medium is the space provided by the car itself, such as cards on dash, frames inside hangings from the car roof.

When advertising makes a sale it should also make a friend.

This direct advertising should enlarge on service changes.

A good feature to be emphasized is the cost of operating an automobile, for it has been demonstrated that no type of car can be operated for less than 10 cents a mile.

Another feature which can be utilized is the fact that the street railway in many communities is essential, and this being the case, every citizen should see that the local line is supported.

The moving picture theater should be a prospective field. Shops, power plant, carhouses, inspection force, track department, all should be brought to the notice of the public.

Publications circulated through boxes in the cars have proved to be effective.

Billboards offer a medium heretofore but little used.

Statements to employees and to the public should be easily understood.

Service: Service is the most important thing to be considered.

Service must start in the carhouses and shops.

Cars must be swept and kept cleaned.

Mechanical inspections must be rigid.

Rearrangement of stops in the downtown districts in some instances have increased speed 100 per cent.

Education of Employees: The greatest field ahead of street railway operators lies in the training of their transportation forces.

Such training involves courtesy, politeness and careful operation.

Company publications have proved valuable in obtaining the co-operation of the employees, which is a vital feature.

Care must be taken in the selection of men. Pleasing appearance and an understanding of the salesmanship features of his work are important.

Those types which are morose or easily irritated should not be hired.

A period of probation has, in some instances, seemed advisable.

The employment manager should be a specialist.

It should be a part of the trainman's job to be polite under all circumstances and he should be helped or penalized to overcome any other inclination.

Company meetings, lectures, service, codes, inspection reports, rigid enforcement of rules, and gradual elimination of those who cannot adapt themselves, must all be depended upon to maintain a proper standard of courtesy and service.

Shop committees have proved to great advantage, and even where a union force is maintained such committees can be formed. If union contracts prevent this being used as a medium for changing working conditions at least it should be used for the purpose of securing co-operation between the management and the employees.

Some form of disability or retirement plan should be seriously considered.

The job should be made as nearly fool proof as possible.

Ticket Fares: Tickets offer a more complete form of merchandising transportation because there is something concrete to merchandise.

Tickets do not have the same mental effect as money, and they have a widespread effect on the short hauls.

Sale of tickets should be pushed through agencies, advertising, street salesmen, and in some companies even a sales manager has been appointed to handle this department.

Jitney Competition: If street railways must compete with the jitney they should be allowed to do so on equal terms, and monopoly restrictions should be removed.

Jitney competition can be met and overcome only by closer economies of operation and a service which meets the public need.

The safety car seems to offer a near solution.

The Safety Car: Safety cars should be built not only from the standpoint of economy, but from the standpoint of merchandising transportation. Interiors should be pleasing; seats should be upholstered, and the ride made as comfortable as is consistent with the nature of the car.

The small safety car has proved to be one means of helping to meet jitney competition.

Some safety car operating figures show an increase in car-miles of 30 per cent, decrease in headways 30 to

37 per cent, and in actual saving of approximately $2,000 per year per car in power and platform costs.

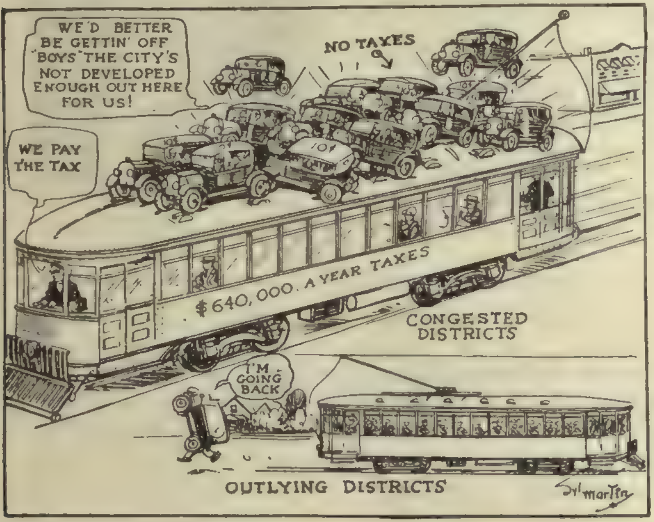
The jitney competition will be met with the safety car through its frequency and regularity of service and high speed.

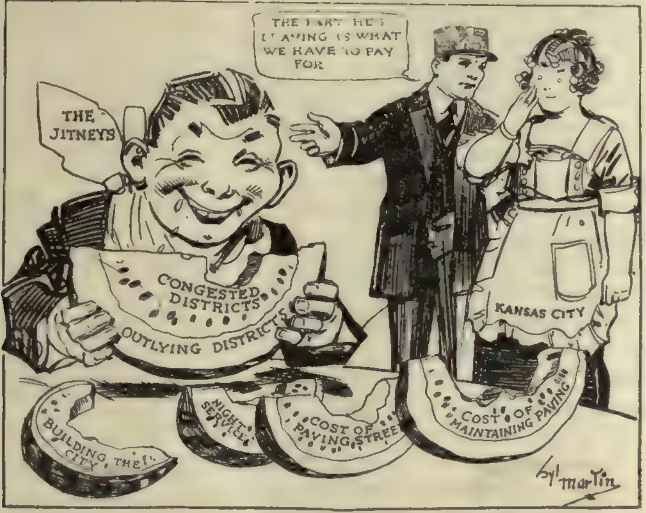
Safety features can be stressed in contrast with the conditions under which the jitney operates, as well as the fact that it promised superior comfort in all weathers and temperatures.

Public utility commissions and chambers of commerce can materially assist in keeping before the public the fact that prosperity to the railroad means better service to the public.

Company representatives should have membership in Kiwanis clubs, Rotary clubs, employers' organizations and business men's organizations.

Hotels, department stores and steam railroad stations can be utilized in various ways to merchandise transportation, a particularly effective method being the placing of pocket schedules in information booths or maps showing car routings.





TYPICAL CARTOONS PRESENTED BY THE COMMITTEE ON MERCHANDISING TRANSPORTATION

The committee in conclusion expresses the belief that while it is probable that all of the recommendations cannot be carried out on all lines, some of the suggestions made are suitable to every railway system and that the sale of good service can be increased if a scientific effort is made along these lines. The committee which presented the report consisted of F. G. Buffe, chairman; W. J. Flickinger, W. H. Boyce, F. R. Coates, M. B. Lambert, A. Stuart Pratt, S. L. Vaughan, B. W. Frauenthal, A. L. Kempster and Joseph H. Alexander.

After the report on merchandising transportation was concluded, a motion-picture film, prepared by the Kansas City Railways under Mr. Buffe's direction, was shown to the meeting. The film had just been completed and this was its first exhibition. It was made for the purpose of informing the residents of Kansas City, Mo., and Kansas City, Kan., on the great plant and investment, with which the public has little knowledge, required to furnish transportation. The picture was well received by the delegates, many of whom gained therefrom a new idea of how the public can be approached in a manner both interesting to it and valuable to the utility.

L. H. Palmer, Baltimore, reported for the committee appointed to consider the suggestion made earlier in the convention for co-operation of this association with the Claims Association in appointing a joint committee to work with the National Safety Council. The committee recommended the appointment of such a committee and that the association become a member of the National Safety Council. These recommendations were adopted.

J. P. Barnes, chairman committee on resolutions, presented a resolution thanking the officers and committee members for efficient work performed by them during the past year.

OFFICERS FOR THE ENSUING YEAR

J. N. Shannahan then read the report of the nominating committee, which was as follows:

President, R. P. Stevens, president Republic Engineers, Inc., New York, N. Y.

First vice-president, L. H. Palmer, assistant to the president United Railways & Electric Company, Baltimore, Md.

Second vice-president, Garrett T. Seely, vice-president and general manager Pennsylvania-Ohio Electric Company, Youngstown, Ohio.

Third vice-president, J. K. Punderford, vice-president the Connecticut Company, New Haven, Conn.

Executive committee: G. H. Clifford, Fort Worth, Tex.; A. Gaboury, Montreal, Canada; T. C. Cherry, Syracuse, N. Y.; and J. V. Sullivan, Chicago.

President Collins expressed his sincere appreciation of the prompt and efficient co-operation given him by the members all the year. The meeting then adjourned *sine die*.

Engineering Association Proceedings

E. R. HILL
Retiring President

Outstanding Features of the Convention of the Engineers Were Addresses on the Proposed "Super-Power System," by W. S. Murray, and on the Problems of Heavy Electric Traction, by A. H. Armstrong. The Safety Car Was Considered Jointly with the Transportation Men. Committee Reports Were of High Quality

W. G. GOVE
President-Elect

THE Engineering Association opened its meeting on Oct. 11 with an address by President E. R. Hill, which was in part as follows:

"In some respects the past year has been uneventful, in that no sensational development either at home or abroad has occurred to disturb, broadly speaking, the normal activities of the country. The year, however, has been a very important one in the history of the country and of the electric railway industry, as it has marked the climax of many of the unhealthful influences which followed the war and were the direct result of it. Among these are low efficiency and high cost of labor in industry, resulting in high prices of materials and products, high cost of living and a tendency toward gross extravagance and waste on the part of a large proportion of the American people.

"To illustrate: Since 1914 the average advance in cost of building material has been 126 per cent, machinery 75 to 100 per cent, railway equipment such as cars and locomotives 87 per cent and foodstuffs 110 per cent. The advance in the cost of living has been estimated by responsible authorities at from 95 to 130 per cent, while wages of skilled and unskilled labor have advanced respectively 119 and 110 per cent. On top of all this, according to the testimony of large employers, the efficiency of labor has seriously declined, in some cases being put as low as 50 per cent.

"It has now become obvious, however, that the climax has at last been reached and that a decline in prices of materials and products has set in and will not stop until all costs, including the very important item of labor, have reached a reasonable, stable and thrifty level. Doubtless the decline will not bring us back to conditions prior to 1914, certainly not for a long time to come, but we shall presently reach a point where the value of the dollar, the rate of interest charged on loans and the efficiency of labor of all kinds will be such that business can be carried on in a normal, constructive and profitable manner.

"Specifically applying war and post-war conditions to the electric railway industry, it is worth our while to look for a moment away from purely engineering matters and to note some of the conditions that confront the properties in which we are interested. The following outstanding facts and figures are convincing:

"(a) As to the magnitude of the electric railway industry: At the beginning of the war there were some 963 electric railway companies in the United States, with a total trackage of 44,000 miles and outstanding stocks and bonds of more than $5,035,000,000 par value.

"(b) Fares on electric railways in some 540 localities, representing a population of 38,000,000, had, up to Oct. 1, 1920, been increased by 1 to 5 cents, the average increase being of the order of 40 per cent. Other lines serving perhaps an equally large population have had no increase in fares.

"(c) Operating revenues of twenty-three important electric railway systems in the five years 1914 to 1919 increased 27 per cent, while expenses increased 56 per cent in the same period and the net income suffered a decrease in 72 per cent.

"(d) Abandoned service and lines dismantled and junked, either of necessity or in order to minimize losses and keep afloat financially, since 1914 have occurred in 130 cases, aggregating 1,226 miles of track.

"(e) Receiverships and foreclosures affecting electric railway properties as of August, 1920, numbered 88 cases, representing 5,160 miles of track and stocks and bonds aggregating $759,162,625 par value.

"The situation indicated above, while primarily due to increased cost of service and inadequate fares, has also been affected by competition of motor vehicles and the general condition of the securities market and the prevailing high rates of interest.

"We are, as an association of engineers, charged chiefly with the solution of engineering problems; what can we accomplish either through our engineering talent or otherwise toward establishing the properties in which we are individually interested and the electric railway industry as a whole on a sound, enduring and profitable basis and make it one of the most useful public institutions in the country? If the definition that 'engineering is the science of controlling the forces and utilizing the materials of nature for the benefit of man and the art of organizing and of directing human activities in connection therewith' is accepted as correct, the importance of the engineer in this work of reconstruction can scarcely be overestimated; in fact, the scope of his work becomes vastly broader than most of us have usually been accustomed to think.

"Both as individual engineer and as an association I think we can do much to bring about this greatly desired result:

"1. We can offset by engineering skill some of the losses and high costs of operation by developing or applying more efficient and economical appliances and methods which will result in lower cost of service; for example, the reduction in the cost of electric power by adopting special fuels, the consolidation of power plants, the purchase of power in bulk and shutting down of obsolete plants, and the use of automatic machinery and devices; subjects of this character have been treated by our committees and will be reported on during the convention.

"2. We can employ improved types of construction materials and apparatus in connection with new work and can follow best established practices and adopt the highest standards. The work of our committees toward standardization is in line with this suggestion.

"3 We can adopt improved methods of maintenance of plant and equipment which will not only reduce the cost but will raise the standard of maintenance. To this end each committee this year has been assigned and will report on a subject dealing with maintenance methods and practices in its field.

"4. We can develop and recommend types of equipment, such as cars and stations, and methods of operation that conduce to public comfort and convenience, thus rendering the service more attractive, increasing the travel and adding to the revenue. The importance of pleasing the public is greater now than ever before in the history of the industry.

"5. We can be well balanced and comprehensive in our point of view and learn to weigh every question from all angles, thus striking a happy medium between progressiveness and conservatism; too much conservatism has hurt many a good property and too radical an attack has sometimes killed a good engineering project before its real merits were understood or appreciated.

"6. Lastly, we can be optimists. There is little use for a pessimist in any line of business. Some one has truly said, 'What the world needs is not more of us but a better brand of us,' and optimism improves the brand. If we can have the courage of our convictions, put product ahead of policy or politics and see the bright side of life and better times ahead, we will keep in condition to do our best work and accomplish the largest results.

"I feel that the Association is to be congratulated not only on its past achievements and the present excellent state of its affairs but especially on the broad field for activity that lies just before it and the as yet uncharted realm of opportunity that the future holds."

THE SECRETARY'S REPORT

Following the address by Mr. Hill, J. W. Welsh read the report of Secretary-Treasurer E. B. Burritt. The latter stated that as a result of the inclusion of manufacturers in the association a full personnel in all committees was provided. In view of the fact that reports must be in the hands of the standards committee early, it is desirable that the secretary have them by June 1, and to that end committees should be appointed immediately after the convention. As an indication of the scope of committee activities he stated that a total of eighteen days of committee meetings has been held, an average of three for each committee. Seven data sheets had been sent out for the following committees: Way, two; power generation, two; equipment, two; and buildings and structures, one. Further, President Hill had secured the approval of the executive committee for application for representation on the American engineering standards committee by one member at present, corresponding to annual dues of $500. During the year the subject of maintenance practices and life of wearing parts had been assigned for consideration by all committees. The prices of the Engineering Manual have also been increased from $2 to $3.50, complete, to members, and the binders, to all, from $1.50 to $2. To non-members the price remains $5 complete.

Early in the year a code of instruction was sent to all members of all committees. Later, in order to permit committee work to start early next year, a letter was sent to executives of member companies asking for suggestions and a large number were received. Early in July a nominating committee was appointed as follows: F. R. Phillips, J. H. Hanna, C. R. Harte, J. H. Libbey, and N. B. Trist. [This committee reported the following nominations as required by the constitution: For president, W. G. Gove; for first vice-president, C. L. Cadle; for second vice-president, C. S. Kimball; for third vice-president, C. F. Bedwell; for secretary-treasurer, E. B. Burritt; for members of executive committee, H. A. Johnson, L. C. Datz, E. H. Scofield, A. B. Stitzer.—EDS.] Finally Mr. Burritt reported the individual membership in the association as 544 and the company section membership as 769.

Next, President Hill appointed as a committee on resolutions C. W. Stocks, F. R. Phillips and J. C. Thirlwall. The report of the way committee was then presented by R. C. Cram. An abstract follows:

WAY MATTERS

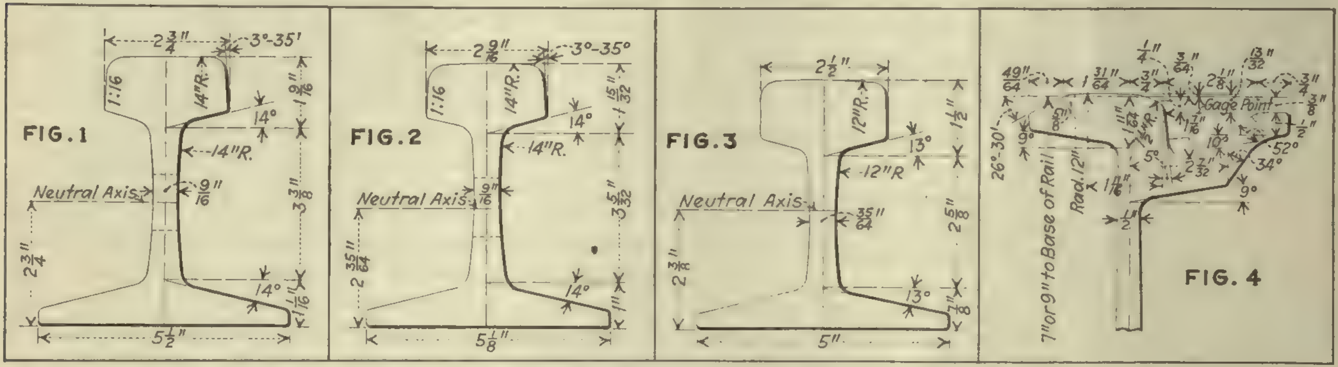
In presenting the report of the committee on way matters the chairman called attention to the increase in membership of the committee and to the size of the report which is due to the nature of the subjects and to the large number of revisions in Engineering Manual data proposed. The stoppage of committee work during the war has heretofore prevented presentation of the accumulation of revisions needed as time elapses and experience requires.

The most important two subjects covered are a recommended system of uniform track spirals and curved heads for the Association standard girder grooved rails. The report presented a uniform system of spirals for adoption, completing the work begun last year. It included all necessary engineering data, together with instructions for use. It is believed to be a big step forward in the Association's efforts to secure maintenance economies. A suggestion was made that the work be continued with the view to standardizing track-center distances and branch-off frogs as a means toward greater economies in costs of special trackwork.

A standard design of curved head placed upon existing association standard girder grooved rails was proposed. The design is one already in use and calls for no new rolls for the rails. This subject was treated exhaustively and illustrations given which help to explain the text. There are about 150 miles of single track in the United States laid with rails having curved heads. The committee inspected installations in several cities and the engineers visited all agreed that the curved head is of great benefit. The curved-head design has not prevented corrugation but has extended the time required for its formation. The committee on equipment concurs with the way committee in the design recommended.

The subject of progress made in rail joints was too broad to be covered in the time available. The committee believes that the association should undertake a test of all types of welded joints, working in co-operation with the United States Bureau of Standards. Unfortunately no funds are available for this kind of research work. The belief was expressed that the application of the arc-weld joint should not be taken up generally until more is known as to its performance in extended service.

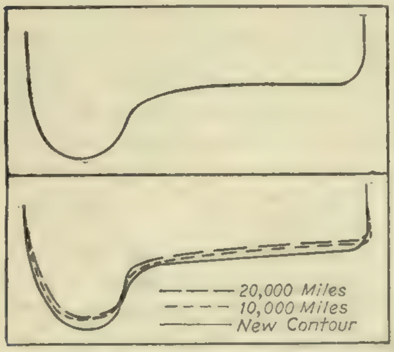
A revised specification for plain bolted special trackwork was submitted. Considerable existing matter was withdrawn and the revisions cover use of American Railway Engineering Association standards for split-switch design, fixtures and spring rail frogs. This should lead to a considerable saving through use of common standards.



FIGS. 1, 2 AND 3—STANDARD T-RAIL SECTIONS, 100 LB., 80 LB., 90 LB. FIG. 4—STANDARD DESIGN FOR HEAD OF 7-IN. AND 9-IN. GIRDER GROOVED RAIL

Conferences were had with representatives of the American Wood Preservers' Association in reference to specifications for wood-block paving but no conclusions were reached and the subject was suggested for continuation.

Under review of existing standards and recommendations, some nine subjects were discussed and important changes proposed. Among these are changes in titles of the specifications for girder grooved rails; specifications for special trackwork; specifications for splice bars; rules for government of way department employees, and designs of plain girder and standard section rails. Three different rails are proposed for the latter in substitution for existing designs. A study of the use of substitute ties for tracks in streets is proposed as a subject for the ensuing committee's attention.



AT TOP, COMPOSITE DRAWING OF AVERAGE WORN WHEEL. AT BOTTOM, DEVELOPMENT OF CURVED CONTOUR OF STEEL WHEEL

The committee presented an abstract from the report of the American Society for Testing Materials for 1919 covering the proposed substitution of the so-called impression test for the existing drop test in the specifications for girder grooved and high T-rails. The committee discussed this with the representatives of the A. S. T. M. and with manufacturers' representatives. It appears that the proposed test does not provide a test for brittleness, which is considered necessary with the testing of girder rails. The committee was not prepared to report favorably or unfavorably and recommended further investigating by the ensuing committee along lines suggested in its report, one of which calls for the addition of a test which will provide a test for brittleness which can be used as a substitute for the drop test.

The committee recommended the use of the term "special trackwork" instead of the term "special work" now generally used in referring to parts of special track construction and proposes a new definition of special trackwork. The new definition was believed to be more indicative of the nature of special trackwork.

The presentation of reliable data on safe limits of wear in rails and special trackwork and on life of track construction was practically impossible. Records are not available. An interesting monograph on life of special trackwork by Victor Angerer was included in the appendix to the report. The committee recommended that the subject be discontinued.

There were, all told, twenty-eight recommendations submitted by the committee, fourteen of which call for changes in the Engineering Manual.

Mr. Cram then gave the reasons for the recommendations in his report, pointing out that the changes in rail sections were designed primarily to provide standards which were more readily obtainable from the rail mills. He also urged the investigation by the association of substitute ties, declaring that in some respects the electric railways were in a better position to use such ties than steam railroads.

President Hill then suggested that the recommendations of the way committee should be taken up and that those which affected standards should first be considered. The first subject considered was the recommendation on a uniform system of track spirals, which was approved. Following this, approval was given to the other recommendations of the committee in connection with standard 7-in. and 9-in. girder rails, plain bolted special trackwork and standard section rails, as well as the recommended changes in wording contained in the "summary of recommendations" appearing at the conclusion of the report. In connection with these changes in standards, Mr. Cram explained that they had received the approval of the manufacturer members of the committee, and in the discussion Messrs. Angerer, Alden and Entwisle, speaking for the manufacturers, explained the benefit which would be derived from the proposed changes. At the conclusion of this portion of the discussion a vote of thanks was extended to the committee, H. H. Adams adding that in his opinion the work had been done in a very thorough manner and would be of great benefit to the association.

Charles H. Clark, Cleveland, expressed the opinion that it is impossible to go very far in standardization of crossing frogs, because it had been his experience that nearly every one needed had to be made special in order properly to meet the crossing angle requirements. But the body of delegates generally manifested a different opinion about this. The motion before the body to adopt the reinsuring recommendations of the committee was carried.

The report of the committee on buildings and structures was then presented by D. E. Crouse, chairman. The committee had made one definite recommendation as to the method of inspecting and maintaining bridges and making reports thereon, which had been placed before the standards committee for action. H. H. Adams reported for this committee that it recommended the association adopt the recommendation of the bridges and building committee as recommended practice. An abstract of the report follows:

BUILDINGS AND STRUCTURES

The committee on buildings and structures reported that bridge inspection and maintenance had been considered by it and as a result of its study and a digest of replies to a questionnaire the following outline was proposed: Bridges should be inspected by the track force daily, by a bridge foreman once a month and by the engineering department in conjunction with the bridge foreman semi-annually or annually. A suggested form for the monthly inspections formed a part of the report, and it was also recommended that the bridge foreman should make a monthly report summarizing the work done on structures. The committee recommended a continuation of the work on inspection and maintenance of buildings and structures.

The sub-committee on lag screws versus bolts in timber-decked structures attempted to find what the experience of steam roads had been in connection with the subject since 1918, but, due to the war, was unable to obtain many data and recommends a continuation of the work.

The sub-committee on fare collection at terminals obtained drawings and diagrams of all known methods. The post-payment method was found to have been discontinued. Three drawings were submitted showing forms of prepayment schemes now in use; turnstiles, change booth and coin box, and ticket booth and cancellation box. The turnstiles are in more general use, due to the requirement of only one attendant, but the other methods expedite the flow of traffic. The sub-committee proposed specific methods for the installation of a prepayment system and recommended such a system where the traffic density warrants its use. The suggestions submitted were as follows: When a prepayment scheme is to be designed for an industrial plant, an effort should be made to anticipate traffic and loading conditions by conferring with plant officials. An attempt should be made to concentrate the load at a minimum number of points, but sufficient track room should be available to reduce the loading time to a minimum. In all runways there should be sufficient reservoir capacity to permit an even flow of traffic. The plant employees should be utilized in handling gates and turnstiles during peak hours. Due consideration should also be given to the storage of cars, as often the prepayment loading point is the train terminal.

The committee report contained an appendix by D. W. Smith covering the use of lag screws in trestle construction, with drawings and data. The committee recommended that its work be continued.

The report was signed by D. E. Crouse, chairman; G. P. Legare, B. R. Brown, E. D. Smith, James Link, J. R. McKay, E. H. Berry, S. J. Steiner and R. C. Bird.

Martin Schreiber in discussing the committee report spoke of the economy of maintaining building structures, saying of the many different ways brought up as to how best to carry on this work that there was no plan which worked so well as to execute the small amount of maintenance work necessary each year. He believed that when the small repairs are deferred, the expense of doing it ultimately is far greater, for, once deterioration is started, it advances with great rapidity. He also expressed the thought that it would have been well for the committee to have carried this investigation a little further to include waiting rooms, shelters, etc., which are necessary as soon as a company begins the use of prepayment terminals. He suggested that next year's committee might take this up.

R. C. Cram called particular attention to the form of report included in the committee's work for use in reporting to state commissions and similar bodies. He thought that this was an important thing, for many public bodies are very particular about the form of reporting and insist on promptness as well. He urged railway men to be very particular to have all bridges used by them inspected by their own men whether the company was responsible for this inspection or not. He thought that it was well to do this to protect the company's interest with the public, for a bridge failure resulting in serious accident was very difficult to explain away even though some one other than the company was responsible.

The recommendation of the standards committee and the report of the committee on building and structures as a whole were adopted.

Tuesday's Session

The first part of the meeting of the Engineering Association Tuesday afternoon was taken up by a joint session with the Transportation & Traffic Association.

The engineers met at 4.30 Wednesday afternoon at the conclusion of the joint session of the Transportation & Traffic Association to hear a paper by E. P. F. McCall, storekeeper South Side Elevated Railroad, Chicago, but unfortunately neither Mr. McCall nor his paper was present, so this had to be postponed until Thursday.

The attention of the meeting was then directed by President Hill to the appointment of a standing committee on purchasing and storekeeping. This was discussed briefly by several delegates and was brought to a head by J. H. Hanna, who moved that a recommendation be made to the executive committee that such a standing committee be appointed. This motion was carried after a discussion in which it was brought out that there had been a movement heretofore to organize a separate association of purchasing agents and storekeepers, which was not wanted, but that the formation of such a standing committee was highly desirable. It was also brought out that the personnel of this committee should be composed of representatives of both small and large properties, for the practices used in the storekeeping departments of large properties are not applicable at all on small properties. The meeting then adjourned.

Wednesday's Session

At the third session of the Engineering Association held Wednesday afternoon reports of the committees on power distribution, power generation and the national electrical safety code were presented. The report of the committee on power distribution was read by Charles Rufus Harte, chairman. This was principally a report of progress and is abstracted below. The specifications and form of contract for electrical conduit construction which formed a part of this report were approved for publication in the Engineering Manual under miscellaneous practices.

POWER DISTRIBUTION

The committee on power distribution reported regarding seven subjects as follows: Revision of overhead line specifications, crossing specifications and specifications for catenary line construction, standard stranding of cables, standard threads on pins and insulators, electrical conduit construction and standard wires and cables.

The report stated that the sub-committee on overhead line material had continued the work begun in 1917 and recommended further study of the subject, and the sub-committee on overhead line crossings recommended that a joint committee of the Engineering Association, the American Railroad Association and the American Railway Engineering Association study this subject. The latter sub-committee presents fourteen points for the consideration of this joint committee in connection with the existing specifications.

No material was presented by the sub-committee on catenary line construction, but the sub-committee on standard stranding of cables submitted a very complete set of specifications and a complete stranding table which it recommended for acceptance as standard only after they are adopted by the American Institute of Electrical Engineers, which was largely instrumental in developing the subject.

The sub-committee on specifications for standard threads for pins and insulators found that there was a growing tendency toward the use of cemented metal pins, so that the importance of thread accuracy is decreasing. It found that no trouble was experienced with the pins and insulators furnished by reputable dealers. In view of these facts the committee recommended standards along general lines.

The sub-committee on conduit specifications and contract forms recommended the appointment of a joint committee representing the various associations to prepare standard contract forms and specifications. It presented some charts and drawings showing manhole and conduit construction.

The sub-committee on specifications for wires and cables reported that it had carried on the revision of the existing specifications in an attempt to treat the subject as a whole rather than in sections. Five of the seven items included have been recommended for adoption as standard.

TABLE I—PROPOSED STANDARD CABLES

Number and size *	Individual Strands Nominal Diameter Mils	Individual Strands Nominal Cross Section Circ. Mils	Total Nominal Cross Section Circ. Mils	Total Diameter Inches
127—No. 8	128.5	16,510	2,097,000	1.671
127—No. 9	114.4	13,090	1,662,000	1.487
91—No. 8	128.5	16,510	1,502,000	1.414
91—No. 9	114.4	13,090	1,191,000	1.258
61—No. 8	128.5	16,510	1,007,000	1.157
61—121 mils	121.0	14,641	893,100	1.089
61—No. 9	114.4	13,090	798,500	1.030
61—107 mils	107.0	11,449	698,400	.963
61—No. 10	101.9	10,380	633,200	.917
37—116 mils	116.0	13,456	497,900	.812
37—No. 10	101.9	10,380	384,100	.713
37—97 mils	97.0	9,409	348,100	.679
37—No. 11	90.74	8,234	304,700	.635
19—No. 9	114.4	13,090	248,700	.572
19—107 mils	107.0	11,449	217,500	.535
19—No. 11	90.74	8,234	156,400	.454
19—No. 12	80.81	6,530	124,100	.404
19—No. 13	71.96	5,178	98,380	.360
19—No. 14	64.08	4,107	78,030	.320
7—No. 10	101.9	10,380	72,660	306
7—No. 11	90.74	8,234	57,640	.272
7—No. 12	80.81	6,530	45,710	.242
7—No. 14	64.08	4,107	28,750	.192
7—No. 16	50.82	2,583	18,080	.152
7—No. 18	40.30	1,624	11,370	.121
7—No. 20	31.96	1,022	7,154	.096
7—No. 22	25.35	642 4	4,497	.076
7—No. 24	20.10	404 0	2,828	.060

*—Sizes are expressed as A. W. G. gage numbers except where diameters are given in mils.

The committee stated that it was unable to obtain satisfactory data on the subject of safe limit of wear on trolley wire, frogs, life of insulators, life of cable insulation, etc., and reported progress, with a recommendation that the work be continued.

The report was signed by Charles Rufus Harte, chairman; C. C. Beck, J. H. Drew, R. W. Eaton, H. H. Febrey, C. J. Hixson, C. H. Jones, J. H. Libbey, F. McVittie, M. B. Rosevear, W. Schaake and A. Schlesinger.

POWER GENERATION

The report of the committee on power generation was presented by C. A. Greenidge, chief engineer J. G. White Management Corporation, in the absence of A. B. Stitzer, chairman of this committee.

TABLE III—PROPOSED STRANDING—FLEXIBLE CABLES

Nearest A. W. G. Size	Cross Section Circ. Mils.	Diameter of Cable Mils.	No. of Wires	Size of Each Wire A. W. G.	Size of Each Wire Diameter	Construction
....	2,039,000	1 885	703	15.5	53.9	37 x 19
....	1,816,000	1 779	703	16.0	50.8	37 x 19
....	1,617,000	1 679	703	16.5	48.0	37 x 19
....	1,440,000	1 584	703	17.0	45.3	37 x 19
....	1,284,000	1 496	703	17.5	42.7	37 x 19
....	1,103,000	1 372	427	16.0	50.8	61 x 7
....	874,600	1 222	427	17.0	45.3	61 x 7
....	693,600	1 088	427	18.0	40.3	61 x 7
....	550,000	969	427	19.0	35.9	61 x 7
....	436,200	863	427	20.0	32 0	61 x 7
....	345,900	768	427	21.0	28.5	61 x 7
....	274,300	684	427	22.0	25 3	61 x 7
....	264,600	671	259	20.0	32.0	37 x 7
0000	209,800	598	259	21.0	28.5	37 x 7
000	171,300	538	133	19.0	35.9	19 x 7
00	135,900	479	133	20.0	32.0	19 x 7
0	107,700	427	133	21.0	28.5	19 x 7
1	82,780	332	91	20.5	30.2	Concentric
2	65,650	295	91	21.5	26 9	Concentric
3	52,060	263	91	22.5	23.9	Concentric
4	39,190	228	61	22.0	25.3	Concentric
5	31,080	203	61	23.0	22 6	Concentric
6	24,650	181	61	24 0	20 1	Concentric
8	17,410	152	61	25 5	16.9	Concentric
10	10,560	118	37	25.5	16.9	Concentric
12	6,640	94	37	27.5	13.4	Concentric
14	4,176	74	37	29.5	10.6	Concentric
Smaller	....	......	To equal required size....	30.0		Bunched

TABLE II—PROPOSED STRANDING—CONCENTRIC LAY CABLES

Size (See Note 1)		Number of Wires (See Note 2) A Bare Insulated or Weatherproof Cables for Aerial Use	 B Insulated for Other Than Aerial Use
2.0 circular inches	1,013	91	127
1.5 circular inches	760	61	91
1.0 circular inches	507	61	61
0.6 circular inches	304	37	61
0.5 circular inches	253	37	37
0.4 circular inches	203	19	37
0000 A. W. G	107	19 or 7 (See note 3)	19
00 A. W. G	67.4	7	19
2 A. W. G	33.6	7	7
7 and smaller	10.5	....	7

NOTE 1.—For intermediate sizes use stranding for next larger size.

NOTE 2.—Conductors of 0000 A. W. G and smaller are often made solid and this table of stranding should not be interpreted as excluding this practice.

NOTE 3.—Class A cable sizes 0000 and 000 A. W. G. is usually made of seven strands when bare and nineteen strands when insulated or weatherproof.

The subjects considered by the committee on power generation this year were as follows: Form of power contract for the purchase of power, comparative cost of steam production in power plants using coal, oil, gas or other fuels, statistics of cost of power generated by member companies. These subjects were handled by sub-committees and the results were presented in detail by means of tables and charts.

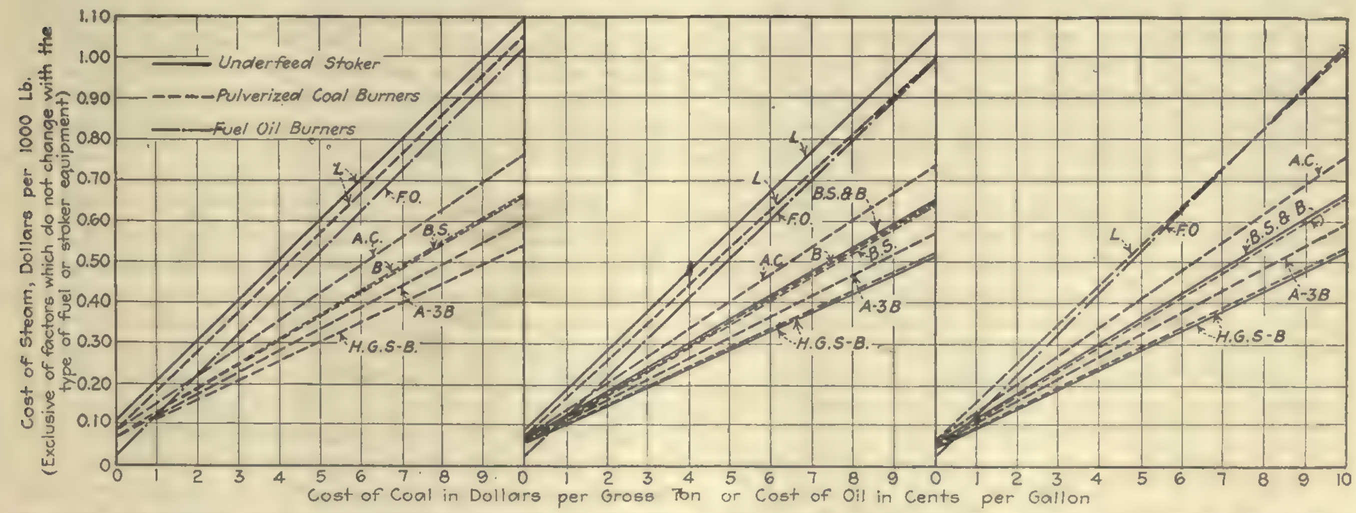
The form of power contract recommended covers the subject in detail and may be modified to suit particular conditions. The contract deals with demand and demand charges and also contains a clause which considers the effect of power factor on charges to be made. A coal clause is incorporated in the section covering the energy charge. The committee comments on each clause of the proposed contract and outlines its reasons for the wording of the clauses.

W. S. Finlay, Jr., submitted the main paper on the comparative costs of steam production in power plants using various fuels. In order to limit the scope of the subject to reasonable bounds, a medium-sized boiler plant was assumed, with equipment of known characteristics and operating under certain fixed conditions. The costs and comparisons were compiled from the results of a questionnaire sent to manufacturers and member companies. The sub-committee on that subject found that the status of chain grates and overfeed stokers was unchanged during recent years, but that the underfeed stoker had developed rapidly. The sub-committee maintains that the underfeed stoker holds the premier position in power service, but that modern developments and increased labor costs make it imperative that the stoker manufacturers develop the stoker as a system rather than as a mechanical unit, *i.e.*, coal-handling apparatus and methods must be included.

The committee discussed the use of pulverized fuel and incorporated written statements received from manufacturers. It appeared that there is no decided difference in the commercial success of a good stoker plant and a good pulverized-coal plant when all elements of cost are considered. The pulverized-fuel equipment cannot be used on an economic basis in small plants having a capacity of less than about 2,000 b.hp. From an operating standpoint the pulverized-fuel plant presents many advantages in regard to cleanliness, possibility of using low-grade fuel, standby savings and sanitation, but great care is required to avoid slagging troubles when high boiler ratings are desired. The pulverized fuel permits a higher combustion temperature, but it appears that a better adaptation of the boiler and furnace must be made to utilize fully this increased temperature and to avoid slagging.

The question as to the civic nuisance caused by ash dust from the stacks of plants using pulverized fuel was raised by the committee for discussion. It seemed to the committee undesirable to change a modern stoker plant to a pulverized-fuel plant, but pulverized fuel should be considered on its merits in remodeling an old plant or when installing a new plant.

In discussing oil Mr. Finlay stated that the situation today is that oil is a local fuel in so far as the general power situation is concerned. H. P. Bell stated that even in California the increasing price and decreasing production of oil is causing the development



PLANT DESIGNED FOR MAXIMUM BOILER RATING OF 100 PER CENT. YEARLY OUTPUT 1,022,000,000 LB. OF STEAM NET, LOAD FACTOR 50 PER CENT

PLANT DESIGNED FOR MAXIMUM BOILER RATING OF 200 PER CENT. YEARLY OUTPUT 2,044,000,000 LB. OF STEAM NET, LOAD FACTOR 50 PER CENT

PLANT DESIGNED FOR MAXIMUM BOILER RATING OF 300 PER CENT. YEARLY OUTPUT 3,066,000,000 LB. OF STEAM NET, LOAD FACTOR 50 PER CENT

DIAGRAMS FOR USE IN COMPARING COST OF STOKER EQUIPMENT AND FUEL

Boiler Equipment 12,600-hp., inclined header, longitudinal-drum, B. & W. boilers, 21 tubes wide and 14 tubes high, with no superheater; baffling, three vertical passes, steam pressure 200 lb. gage. feed-water temperature 200 deg. F.

Fuels: A 3 B, anthracite coal No. 3 buckwheat; A C, anthracite culm; L, lignite; B S, bituminous slack; H G S B, high grade semi-bituminous; B, bituminous; F O, fuel oil.

Cost Factors Included—The costs do not include factors which are the same for all classes of fuel and fuel-burning equipment, such as cost of boilers, buildings, etc. The cost of auxiliary power is included by assuming that 1 kw.-hr. requires 1.75 lb. of coal or 1.3 lb. of oil.

of hydro-electric power as a relief measure, and the trend is to use oil only on the peaks, in low-water periods and under emergency conditions.

The committee briefly discussed colloidal fuel and gas also, but considered them unavailable for general power purposes. The colloidal fuel promises good results, but gas is limited to auxiliary and emergency service.

The report contained statements from manufacturers which outline the developments made in stoker equipment, in pulverized-coal equipment and in oil-burning equipment.

In comparing costs, an assumed plant was considered with assumed conditions of operation. Twelve 600-hp. B. & W. boilers without superheaters, 200 lb. steam pressure, 200 deg. Fahr. feed-water temperature, 50 per cent load factor, a load curve and three maximum loads were features of the hypothetical plant. At 100, 200 and 300 per cent boiler rating the weights of steam produced per day were assumed to be 2,800,000, 5,600,000 and 8,400,000 lb. respectively.

A chart was prepared as a result of the comparisons, covering all items which would be taken into consideration when comparing various types of fuels and fuel-burning equipments. This is reproduced herewith.

In a summary the sub-committee drew only general conclusions, but stated that the graph will provide data that may be applied to a particular case.

Underfeed stokers, the committee reported, will hold their own where high-grade bituminous or semi-bituminous coal can be obtained and the pulverized-fuel burning equipment will yield a saving where low-grade fuels are available. They will become more and more important, due to the increasing scarcity of high-grade fuel.

The sub-committee on the analysis of power plant costs had available complete data from eleven plants operating under nearly the same conditions and ranging in size from 7,250 kw. to 50,000 kw. Operating expenses were considered on a five-year basis under the headings of labor, fuel, lubricants, water and miscellaneous power plant supplies and maintenance. Table I was given to show the average costs on a five-year basis for the items listed and the total operating cost.

Table II was given to show the outputs and load factors for the plants considered on a five-year basis.

The labor costs diminished only slightly in 1919 and the data indicate that they will increase. The same conclusion can also be applied to maintenance costs. The peak in fuel costs seems to have been reached and the committee concluded that the peak in operating costs is not far away. Charts and tables were submitted showing the data from which the tables are derived.

The committee recommended a continuation of the work on power contracts and statistics on power costs, but advised a temporary cessation of work on comparative costs of steam production using various fuels.

TABLE I—POWER GENERATION COST DATA OVER A FIVE-YEAR PERIOD

	1915	1916	1917	1918	1919
Labor:					
Cost per kilowatt-hour, cent	0.12	0.12	0.122	0.164	0.188
Relative cost compared to 1915, per cent.	100	100	102	137	157
Fuel:					
Cost per kilowatt-hour, cent	0.375	0.375	0.573	0.672	0.675
Relative cost compared to 1915, per cent	100	100	153	179	180
Water, lubricants, etc.:					
Cost per kilowatt-hour, cent	0.28	0.28	0.28	0.26	0.31
Relative cost compared to 1915, per cent	100	100	100	93	111
Maintenance:					
Cost per kilowatt-hour, cent	0.049	0.044	0.061	0.096	0.104
Relative cost compared to 1915, per cent.	100	90	125	196	212
Total operation:					
Cost per kilowatt-hour, cent	0.572	0.567	0.784	0.958	0.998
Relative cost compared to 1915, per cent.	100	99	135	167	174

TABLE II—POWER-PLANT OUTPUTS AND LOAD FACTORS OVER A FIVE-YEAR PERIOD

	1915	1916	1917	1918	1919
Output in kilowatt-hour	52,500,000	61,700,000	70,200,000	74,000,000	79,000,000
Relative changes in outputs compared to 1915, per cent	100	118	134	141	150
Load factor, per cent	41.4	41.9	44.6	43.1	46

The report was signed by A. B. Stitzer, chairman; E. H. Scofield, C. W. DeForest, N. A. Carle, W. C. Slade, H. P. Bell, F. A. Scheffler, F. C. Hanker, A. H. Kruesi, W. S. Finlay, Jr., H. E. Davis and C. A. Greenidge.

In the discussion of this report N. A. Carle, chief engineer Public Service Electric Company, Newark, N. J., said in regard to the question of pulverized fuel that he is a firm believer in its use and he sees a largely increased field for it and believes that the burning of coal will in the future be as a pulverized substance. A. T. Perkins, manager for the receiver of the United Railways Company of St. Louis, said that he had a number of minor comments on the form of power contract which is a part of this report and these will be submitted in writing to the committee for their action. E. R. Hill, president of the Engineering Association, said that in regard to the time interval for demand readings that he suggested that a blank space be left in the form of contract so that this could be inserted by users as conditions warranted. The report was accepted and was referred to the committee for the ensuing year for further consideration and report.

C. A. Greenidge read the report of the committee on National Electrical Safety Code in the absence of J. H. Libbey, chairman. It was a brief progress report. The delegates then adjourned to meet in the Greek Temple and listen to an address on "Our Proposed National Power Policy," by W. S. Murray, chairman Super-power Survey U. S. Geological Survey. An abstract of this address is given in another part of this paper.

Thursday's Session

The closing session of the Engineering Association was held on Thursday afternoon, at which three committee reports and two papers were presented. The first paper was on standardization and its effects on stores. This paper was prepared by P. F. McCall, Chicago South Side Railroad. An abstract of the paper which was read by J. W. Welsh follows:

STANDARDIZATION AND ITS EFFECT ON STORES

On the subject of standardization and its effect on stores, P. F. McCall, general storekeeper Chicago Elevated Railroads, said in his paper that in discussing this topic he had assumed that the word standardization refers to such parts of equipment and road maintenance as applies to material carried in store stocks. The rapid progress of the electric railway business up to the present time has made standardization more or less difficult, but, with the work which has been done by the several associations, standards of materials are being given the attention they deserve.

Mr. McCall referred to the consolidation, some eight or nine years ago, of the properties with which he is connected. Upon acquiring the various stores he found a large assortment of similar rolling-stock materials, each of which had a slight difference which would not permit of exchange from one equipment to another. This was equally true with a certain amount of maintenance-of-way materials. It soon became evident that with certain changes a single standard covering all properties could be had on a great many items. Sometimes this necessitated a slight change in design, or merely a reduction or addition in measurement, and, as these items were brought to the attention of the engineering department, an attempt was made to standardize. Work along this line was soon reflected on the stores stocks, as where it was previously necessary, in some cases, to carry four items for certain equipment parts this stock was reduced to one standard.

In acquiring new equipment certain standards were maintained, and where this could be done the numbers of items to be carried in stock were reduced. It was found necessary to carry a larger supply of the same item, but multiplicity of parts carried were brought to a minimum.

Mr. McCall said, further, that it goes without saying that where the numbers of parts carried are reduced the amount of capital invested is likewise reduced. Standardization helps to improve the method of keeping stores, as it is much easier to maintain a stock of standardized materials than it is to maintain a large assortment of materials for which standards have not been arrived at. Facility of supply is greatly improved by the adoption and maintenance of standards by various manufacturers throughout the country. The whole effect of standardization on stores is one of economy of materials and effort, and the further standardization of materials can be carried in harmony with progress of the electric railway business the more evident will that economy become.

To bring about such economy however, the writer did not advocate obsolescence of good serviceable equipment, but said that in acquiring additional equipment attention must necessarily be paid to standards now in existence or to standards which could be used in connection with present property.

Departure from existing standards should be seriously considered by all engineers as to effect on stores stocks and should only be permitted when it has been demonstrated that such a step means a greater benefit to all concerned. Mr. McCall concluded thus: "As I view it, the 'Litany of the Storekeeper' should include: Blessed are the engineers who bring about lasting standards, as they very materially aid in the facility of supply, reduction of stocks carried, with a subsequent reduction of capital invested, and help bring about a more orderly method of stores handling."

The report of the committee on equipment was presented by the chairman, Daniel Durie. An abstract of this report follows:

EQUIPMENT

The report of the committee on equipment covered eight subjects. Four were reports of investigations on helical gears, standard cars, life of wearing parts and the effect of severe weather conditions on car equipment; three dealt with the standardization of equipment parts, and one involved co-operation with the way committee on rail heads.

Previous standard designs of brake heads, brake shoes and keys were adopted by the Association in 1907 and were revised in 1916. This year's committee submitted revisions from previous standards for three brake heads, shoes and keys, two additional designs for brake heads, shoes and keys, one revision in design of limit gages for brake-head and shoe design, and one new design of limit gage.

The subject of the standardization of motor parts was carried over from last year and much work was done by this year's committee in an endeavor to decide on some definite parts that would permit of standardization, but no definite progress was made. The investigation of the committee indicated that motor manufacturers seemed to have a certain reluctance to agree on standard parts which the operating companies seemed to consider as most desirable to have standardized.

The third subject consisted of a report on the development and use of helical gears and may be summarized as follows: Prior to 1914 there was an effort made to reduce the destructive effects of vibration from railway motor gearing on locomotives and heavy multiple-unit equipments by the use of flexible gears. These involved high first cost and when they were considered for small motors, additional problems were presented due to the space limitations and excessive weight. During the latter part of 1914 an investigation of the railway gearing situation in the United States indicated the desirability of obtaining some better type of gearing for railway motors; first, to produce longer life, and, second, to reduce the destructive effects resulting from gear vibration.

Early in 1915 one manufacturer started tests on helical gearing for use in interurban service. The results obtained indicated that more extensive tests and investigations were warranted, and to obtain information on the numerous variables, helical gears were placed in city, interurban and electrified steam-road service. Gears were installed having a helix angle varying all the way from 5 to 23 deg. Early in 1919, after an analysis of the results obtained, this company adopted a 7½-deg. helix angle as standard for its equipments. Another manufacturer is supplying helical gears with an 8-deg. helix angle on equipments. It appears desirable that an effort should be made to induce all manufacturers to decide on the same helix angle.

When helical gearing was first introduced it was thought that its use might necessitate some special provision to care for end thrust. Numerous tests of end thrust on the equipments now in service, however, show that the existing designs are adequate and that no additional provisions are necessary.

To obtain information regarding results obtained in service from helical gearing the committee addressed a questionnaire to a number of railways operating this type of gearing. As a result of the information thus obtained the following conclusions are of interest:

First—There appears to be a decided reduction in gear noise and a reduction of vibration in favor of helical gearing and even with a worn condition of the bearings or pinions there appears to be an absence of noise with helical gearing.

Second—There appears to be no appreciable difference in the wear on the axle and armature bearings due to end thrust from helical gearing.

Third—The life obtained from helical gearing will undoubtedly be somewhat greater than that now obtained from spur gearing.

Up to Aug. 1 approximately 16,000 7½-deg. helical gears and pinions have been purchased for railway service on approximately 170 railways.

There are possibilities of very great complication if helical gearing with a variety of angles and forms of teeth is used, and a standardization of the helix angle and tooth forms is extremely desirable.

An investigation was made as to the feasibility of adopting a standard car design and the committee reported that it is not feasible at this time to design or adopt a standard car. There was a feeling, however, that there is a wide field of usefulness for such a car, but in order to have it generally adopted it would be necessary for the operating companies to accept general types of construction instead of insisting upon the incorporation of their individual ideas in the cars which they purchased.

The committee reported that it had co-operated with the way committee in preparing and sending out a questionnaire on rail heads to obtain information in assisting to decide on a standard design of girder rail head.

A report on the life of wearing parts gave the line of investigation which had been used by this year's committee and a summary of conclusions. This work was directed along two lines, first toward the determination of the class of information that would be of most benefit, and, second, toward formulating methods for obtaining and recording the data.

The life obtained from car equipment wearing parts was shown to vary widely in different localities due to local operating conditions, service requirements, weather conditions, age of equipment, maintenance methods, etc. The number of variables involved is so great that this year's committee considered it advisable to concentrate its efforts on the more essential parts. An attempt was made to choose a few of the most important wearing parts and to formulate a questionnaire for obtaining information.

As the motor is the prime mover of car equipment the committee decided to obtain information on the life of five essential motor parts, armature bearings, axle bearings, gears, pinions and carbon brushes.

The questionnaire was sent out to 110 railways in the United States and Canada, those that operate one hundred or more cars. The replies received were tabulated and analyzed, and while the tabulations are not included in the report, a bulletin has been prepared which the Association will furnish upon request.

As a result the committee found as follows:

1. The replies to the questionnaire indicate the advisability of continuing the study of the life of wearing parts of car equipment.

2. The general opinion of the committee is that the replies received are rather inconsistent, and in many cases misleading and possibly useless as far as containing information for comparisons of different operating companies. The committee therefore feels that sufficiently accurate and reliable information cannot be obtained through the use of the questionnaire method.

3. The variation in the life given for the same part under similar service conditions as indicated by the answers was very great. For example, the figures given for the life of 40-hp. motor armature bearings varied from 5,800 to 200,000 car-miles in city service.

4. It is evident that the conditions existing on the different properties, such as service requirements, types of rolling stock, character of roadway, grades, curves, climate conditions, age of equipment and maintenance methods, are vital factors in the life of wearing parts. To permit the reaching of reliable conclusions these conditions must be known and their effect considered.

5. It appears that many roads are not keeping reliable records, so that it is impossible for them to give information of value. Some of the answers received give the life of wearing parts as the total number of parts used during the year 1919 divided by the car-mileage made during that year. Manifestly this is not the correct life. In regard to the limits of wear it appears that this subject should be properly studied in connection with the life obtained. From some of the answers received it appears that by using some parts after their useful life has been exceeded, the life of other parts is often reduced. A careful analysis and study of reliable operating data should decide the limits of useful wear and should prove of much benefit to operating companies.

The committee recommended that the subject of the life of wearing parts of electric car equipment be followed up and information collected by the Association so as to be available to the member companies, and that the work be carried on during 1920 and 1921 by at least two men reporting to the equipment committee who are either operators or men who have had operating experience. The report made should be based on about a three-month field survey, during which time the men would visit at least ten or twelve properties.

This year's committee made a careful study of the existing standards as adopted by the Association, together with proposed standards which were referred back to it by the committee on standards at the beginning of the year. As a result of this study the committee recommended revisions in the dimensions and designs as follows:

(a) Dimensions for A.E.R.E.A. steel-wheel designs.
(b) Standard tread and flange contours for steel wheels.
(c) Limit of wear gage for flange ⅞ in. in thickness.
(d) Association standard journal boxes and brasses.
(e) Journal box and contained parts for 3¼-in. x 6-in. journal.
(f) Gages for journal bearings and wedges.
(g) Standard specifications Et 12A—Specifications for solid wrought carbon steel wheels for electric railway service.

The eighth subject was a report on the effect of severe weather conditions on car equipment. This year's committee sent out a questionnaire on the subject. From the replies the following among other conclusions were drawn:

Few electric railways have a definite snow-removal program, but it is evident that those which have outlined such a program and adhere to it receive much benefit. The answers received indicate that these companies have fewer equipment troubles than others.

Very few companies have a continuous snow condition. The general method seems to be to clear to the pavement between tracks in city districts and a few remove the snow from the outside areas.

It appears that a majority of railways have definite obligations regarding snow removal specified by the city, but that the cities through which they operate assume no obligations themselves.

Most railways remove snow with their own crews and very few contract for snow removal by carts or other vehicles.

In a few cases sewer manholes have been used on main streets to good advantage, and the general opinion seems to be that it is very desirable to use sewers where they are of sufficient capacity and when the consent for their use can be obtained readily.

Difficulties with frost lifting of track or pavement are quite general and an apparently satisfactory method of reducing this appears to be through maintaining good drainage, cementing the pavement in where possible, and sealing the pavement to the rail to prevent water getting in.

Very few railways have taken any measures to keep traffic off the tracks in winter. In most sections this appears to be entirely impossible. There are a few places, however, where city ordinances prohibit vehicles running on the rails during snow periods, and in some sections troubles are reduced by urging co-operation with drivers of teams, automobiles, motor trucks, etc.

The use of salt seems to be quite general for keeping spring switches open, but with an accumulation of snow it is necessary to use broom and shovel in addition. Outside of the use of salt for switches it is used very sparingly at the other points.

The principal types of snow-fighting equipment used by electric railways consist of wing plows, spreader plows, machine plows, push plows, pilot plows, flangers, drags, ice cutters and snow sweepers.

Sweepers are used quite generally and to good advantage for light snow and for city work. Plows appear to have some advantage for deep snow and opening up suburban lines.

Very little attention has been given to developing apparatus for cutting ice from between rails. This appears to be a field of development to which considerable attention should be given as it is evident that a large amount of equipment trouble comes from high ice conditions between the rails. The clearances between the motors and roadbed are small at best and with an accumulation of ice it is difficult to obtain the necessary tractive effort, so that spinning of wheels takes place with serious results to the motor windings. Such troubles are particularly in evidence on equipments with small-diameter wheels. There seems to be a great need for some efficient equipment that will cut down and remove ice from between rails.

The principal equipment failures resulting from extreme winter conditions consist of water in motors, roasted armatures and fields, grounded rheostats and cables and general burn-outs to electrical wiring and equipment. Some trouble has been experienced due to breakage of resistors when they are suddenly cooled when splashed with cold water or slush. Most roads have provided shields to protect resistors.

It appears that ventilated motors have performed fully as well as closed motors during the extreme weather conditions. In this connection, however, the consensus of opinion seems to be that closed motors are much to be preferred for operating snow-removal equipment, as the advantages of a ventilated motor cannot be fully utilized in this service, and often in extreme conditions the equipment should be as fully protected as possible. On few roads the ventilating holes are covered during extreme conditions of snow and water, and no evil effect results from this procedure.

Considerable difficulty has been experienced due to collection of snow in motors and to the clogging of drain holes. Frequent inspection and cleaning out of these holes have produced good results.

A few roads report hot bearings as a result of the entry of water into housings, its freezing preventing proper lubrication. With the later equipments, however, no particular difficulty is reported.

Most of the railways which sent in information are dipping and baking armatures and fields. The opinion is general that less trouble is experienced with motors that have their armatures and fields dipped and baked than with those not so treated.

In general there appears to be a greater breakage of gears and pinions during severe winter weather, but these breakages are not excessive.

A few roads report damage to gear cases by high pavement and ice conditions between rails, but there appears to be nearly as much trouble from wearing through of gear cases at the sides due to neglect to keep the gear cases lined up properly. The damage to gear cases appears to be about equally divided between malleable iron and pressed-steel types.

Very few roads use any special methods for testing the equipment which has operated through water. A few dry out water-soaked equipment over heated pits, but the general practice seems to be to remove water-soaked fields and armatures and to bake them in an oven to prevent trouble.

DISCUSSION OF THE REPORT

The first subject opened for discussion was "Dimensions for Steel Wheels," which had been approved previously by the committee on standards. There was some discussion as to how railway companies would benefit by the adoption of these standards and how they would reduce costs and secure better deliveries. H. H. Adams stated it was not right for the association to set up standards so that the manufacturer can use them to the disadvantage of a company, and it did not seem right for member companies to be penalized for not using standards. R. H. Dalgleish said all had been led to believe that by adopting standards the ultimate costs to users would be reduced and also better deliveries could be obtained, as manufacturers could keep standardizd wheels in stock. He cited a case where a manufacturer had refused to make wheels other than standard unless an additional cost per wheel were added to the price. Mr. Dalgleish said it would be better not to adopt standards than to have these used by manufacturers to penalize the railways.

W. G. Gove said that there was no question that the adoption of standards would reduce costs to users, secure better deliveries and be of great advantage to all concerned, and that he was certain no manufacturer would increase the costs unnecessarily. On motion, the standard dimensions for steel wheels as recommended by the committee were approved.

The design of tread and flange contour for steel wheels as submitted by the committee was referred back for further consideration and study so as to see if any interference existed in connection with the standard rail sections, switches, mates and frogs of the association.

The next subjects discussed were: (1) The limit of wear gage for flange ⅞ in. in thickness, (2) revision of association standard journal boxes and brasses, (3) journal boxes and contained parts for 3¼-in. x 6-in. journal, and (4) gage for journal bearings and wedges. The recommendation of the standards committee for adoption of these reports was adopted without discussion.

On the subject of revision of specifications for solid wrought carbon steel wheels for electric railway service Norman Litchfield, American Car & Foundry Company, suggested that the proper action was to secure joint action between Engineering Association and the American Society for Testing Materials. It was decided to refer this report back to the equipment committee for the ensuing year. The same action was taken on the subject of gaging points and terms for wheel and track. The subject of brake shoes, brake shoe heads and brake shoe keys was also referred back to the committee. In the discussion of subject No. 4, "Investigate the feasibility of adopting standard cars," H. H. Adams, Chicago Surface Lines, emphasized the desirability of uniformity of car design. He suggested standards of varying length for cars (by one or more car windows) and of varying width to suit local track centers. Later it was moved and passed that the executive committee be requested to appoint a special committee composed of representatives of the Enginering Association and of the manufacturers to consider anticipatory standards, with special reference to cars and car equipment.

Concerning subject No. 3, "Report on helical gears," E. D. Priest, General Electric Company, stated that the last sentence recommending the adoption of a 7½-deg. helix angle was erroneously included, as the committee never acted upon this point. It was moved and passed to omit this sentence and the remainder of the report was accepted.

The report of the committee on heavy electric traction was briefly abstracted by Sidney Withington, New York, New Haven & Hartford Railroad, chairman.

HEAVY ELECTRIC TRACTION

The committee on heavy electric traction has this year reported on the following assigned subjects: Recent developments and progress in the design of motors and motor drives for heavy traction, both alternating current and direct current, with comparison of weight, space, efficiency, etc.; description and illustrations of recent types of electric locomotives and comparison of electric and steam switching engines in freight yards.

The first two subjects were treated in the form of a general discussion. As to gear drive the committee stated that the major limitations are as follows: Gear reduction, necessary clearance about motor and gearing, maximum safe locomotive speed and permissible dead weight on the axle. The length of the motor is limited by the space between the backs of the drivers, less the space required for the gear and gear case. The clearance between the bottom of the motor and gear cases and the rail should not be less than 5 in., which limits the motor diameter, gear diameter and number of teeth. The power limitations are fixed by the size of the motor and the gear ratio.

The quill drive, with spring supports between the motor and the wheels, was introduced to relieve the track distress due to heavy dead-axle loading, and has been successful for passenger, light freight and switching service. This type of mounting also affords opportunity to use larger motors than could be applied to axle mounting. The size is limited by the cab space occupied by the motor. The torque capacity is limited by the quill spring and the speed by the velocity of the armature, spring parts, gearings, journals or wheels.

In order to secure better weight efficiency the twin-motor quill drive has been developed; the pinions on each armature meshing into a common gear. The smaller armature diameter permits higher armature velocities, and by suitable gearing this secures higher horsepower rating per axle. The side-rod locomotive without gears permits axle loading similar to that of steam locomotive practice. This design necessitates the use of a few large motors and is economical for high-speed passenger service. It is not economical for low speeds, 15 to 20 m.p.h., because the speeds of driving wheels and armatures are the same and too low for the most economical design of motors. The geared side-rod locomotive has been developed for heavy freight service. It permits economy in motor design and also makes possible the driving of two or three axles from a pair of motors. The gearless motor has been successful in passenger service since 1906 and is economical in such service for reasons already outlined.

The single-phase commutator motor has been developed by stages for heavy traction service. Resistance leads were used in the early designs and gave trouble due to the use of improper materials in the construction. Monel metal is now used and most of the trouble has been eliminated. Another type has been developed, which starts as a repulsion motor and omits the use of resistance leads. The neutralization of the sparking voltage is secured by exciting the commutating winding in shunt with the main field and armature circuit. Commutation is improved by the use of interpoles and power-factor correction is obtained by means of an auxiliary winding distributed across the pole face. This motor, used on the Pennsylvania electrification out of Philadelphia, represents a 25 per cent increase in weight efficiency over previous designs of commutator motors.

An interesting design is the three-phase induction motor used on the Pennsylvania. This has wound secondaries, and the collectors are mounted on a shaft extension outside of the motor windings, which permits ready inspection. The leads to the collectors pass through a portion of the rotor spider and axially through the shaft and at the end of the shaft are connected to the collector rings by means of flexible copper connections. This design secures a maximum of active motor material between the side-frames of the locomotives.

The development of the 3,000-volt direct-current locomotive has carried with it every important development in direct-current motor design and important progress has been made in the use of insulation for this voltage.

The committee stated that it had found difficulty in obtaining exact data on steam and electric switching service. Where a considerable amount of switching is done, both passenger and freight, the electric switching offers several economies and advantages. Three electric switchers accomplish easily the work of five or six steam switchers. No relay engine is required and no time is lost for coaling, watering, cleaning fires, etc., as is the case with steam operation. The yard tracks are more intensively used, the yard capacity is increased and labor cost is decreased. Smoke is also eliminated by the use of the electric operation.

The use of electric switching offers more advantages in passenger service than in any other, particularly in the case of multiple-unit equipment. A chart introduced by the committee shows that the electric motive power tonnage per mile of track electrified has been nearly constant since 1905 in heavy electric traction.

In conclusion the committee advocated a "clearing house" for heavy electric traction study to avoid duplication of effort by the several organizations interested in the subject. The report was signed by Sidney Withington, chairman; L. S. Wells, C. H. Quereau, J. H. Davis, J. C. Davidson, R. C. Taylor, R. Beeuwkes, A. M. Eaton and J. V. B. Duer.

Following the heavy traction report A. H. Armstrong, General Electric Company, presented an address on "Electrification of Railroads," illustrated by lantern slides. An extended report of Mr. Armstrong's address will not be given here as this paper expects to report fully the address which he will give on the same subject at the joint meeting of the A. I. E. E. and A. S. M. E. in New York Oct. 22.

The committee on resolutions expressed the appreciation of the association to E. R. Hill, president; E. B. Burritt, secretary; James W. Welsh, special engineer, and other officers for their untiring work. The thanks of the association were given to the manufacturers for their earnest co-operation, to A. H. Armstrong and W. S. Murray for their interesting addresses, to the technical committees for their services and to the citizens of Atlantic City, who had helped to make the convention a success. Appreciation of the excellent attendance at the meetings was expressed and sympathy was extended to the families of deceased members.

OFFICERS ELECTED

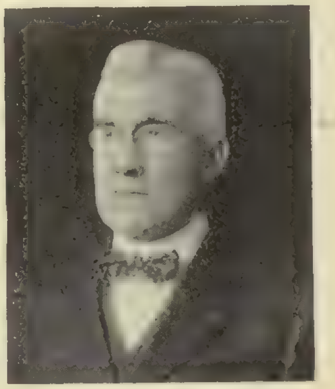
The nominating committee announced the selection of officers for the ensuing year and the following were elected: president, W. G. Gove, superintendent of equipment Brooklyn (N. Y.) Rapid Transit Company; vice-president, C. H. Cadle, chief engineer New York State Railways, Rochester; second vice-president, C. S. Kimball, engineer way and structures Washington (D. C.) Railway & Electric Company; third vice-president, L. C. Datz, chief engineer American Cities Company, Birmingham, Ala.; executive committee, H. A. Johnson, superintendent shops and equipment Chicago (Ill.) Elevated Railways; E. H. Scofield, engineer power and equipment Twin City Rapid Transit Company, Minneapolis, Minn.; A. B. Stitzer, chief engineer Republic Engineers, Inc., New York, and C. H. Clark, engineer maintenance of way Cleveland (Ohio) Railways.

Upon the seating of the new president H. H. Adams moved a rising vote of thanks to Mr. Hill. Mr. Gove in accepting the chair said that he appreciated the handicaps under which he assumed the duties, first, by virtue of succeeding such a man as Mr. Hill and, second, due to the condition of the industry.

Accountants' Association Proceedings

I. A. MAY
Retiring President

How to Collect and Register Fares Under Present Conditions; Accounting and Its Relation to Stock Regulation; Cost-of-Service Accounting and Its Difficulties in Cleveland, and Some of the Financial and Accounting Problems of Utilities in These Tight-Money Days from the High Points of the Accountants' Discussions, Were the High Spots of This Meeting



J. J. LANDERS
President-Elect

THE Accountants' Association opened its session on Monday afternoon, Oct. 11, with the annual address of its president, I. A. May, comptroller the Connecticut Company, New Haven, Conn.

ADDRESS OF PRESIDENT MAY

In his presidential address Mr. May spoke of the past year as having been pre-eminently one of readjustment. The great World War, he said, has brought changes in all lines of business, and especially in the railway business. It has been a hard year for all operators, and of course this has reacted upon the accounting department and brought demands upon it that have been hard to meet. Mr. May, at this point, paid a tribute to the self-sacrifice of the committee members and all those who have spent time in contributing to the work of the association, in view of the pressure of work upon them in the corporations with which they are connected.

He said that he looked forward with great hopes for the future and believes that the opportunities to do more constructive work for the association were greater even than ever before. It seemed to him that this work for the immediate future would be centered largely upon what might perhaps be termed "cost accounting." The method of business control of electric railways, he said, is entirely different from that followed a few years ago. The companies are now being asked the cost of operating a certain line, or the cost of operating a particular type of car, and under these conditions there will be plenty of material for the accountants to work on during the coming year.

He recommended that the three joint committees as well as the two standing committees of the association be continued, and to illustrate the kind of work he had in mind for committee activities he referred to the committee on accounting-engineering. He believed good work could be done if this committee could work out some method whereby more detailed cost of operation could be furnished to the engineers and other operating officials. For example, in the first group of operating accounts, namely, way and structures, he believed that the accountants and the engineers could work out some simple method of accounting that would furnish the maintenance engineer with prompt and accurate detailed cost data; that is, the cost of maintaining a particular piece of track and the cost of maintaining different types of track in any one system.

Again, in the next group of accounts, maintenance of equipment, unit costs are wanted by the engineers and officers in charge of equipment. Unit shop costs have been developed in the manufacturing plant, and the cost to operate certain machines is definitely known. Similar data should be compiled for the railways so that the management might know, for example, whether to manufacture trolley wheels or to buy them. The same remarks in a general way apply to energy accounts, such as power stations, certain costs of the transportation department, and even in the general and miscellaneous groups.

Cost accounting, Mr. May said, has been developed in the large manufacturing industries to a fine art, and his message to the association was that it should develop cost accounting in the railway industry in advance of requests that are bound to come to the department for this kind of information.

After Mr. May's address the report of the executive committee was read, the principal feature of which was the committee's effort to encourage joint committee work with other affiliated associations. The report covered two meetings of the executive committee, one in Cleveland Jan. 8, 1920, and one in Atlantic City, Oct. 11, 1910. The first meeting was largely devoted to assignment of subjects to committees and the assignment of subjects for papers to be presented. The most important act of the second meeting was the appointment of a permanent committee to represent the Accountants' Association at the annual conventions of the National Association of Railway & Utility Commissioners. This committee consists of C. S. Mitchell, comptroller Pittsburgh Railways; B. W. Fernald, auditor San Francisco-Oakland Terminal Railways, and John M. G. Horn, comptroller Illinois Traction System, Champaign, Ill. The executive committee reports as follows with reference to this action: "In the past these annual conventions of the National Association of Railway & Utility Commissioners have been held during November, and at our annual convention in October it has been the practice hurriedly to appoint a committee of three members with short notice for these members to arrange their affairs to permit of their attendance at the National Association of Railway & Utility Commissioners' meeting. By adopting the permanent committee idea the former practice will be eliminated."

The plan outlined for the permanent committee provides:

"That it will not meet during the year; that not more than one of the members will attend the annual convention of the above-named association, and the committee member located nearest to the city selected for the annual convention will be the accountant and association representative in attendance."

COMMITTEES FOR 1921

With two or three slight changes in committee membership, which have taken place during the year, the following committees were continued for the ensuing term: Joint committee on claims accounting—H. J. Davies, co-chairman, Cleveland; George B. Cade, Asbury Park, N. J., and Walter Shroyer, Anderson, Ind. Joint committee on engineering accounting—W. E. Jones, co-chairman, Providence, R. I.; B. E. Bramble, Champaign, Ill.; Charles H. Lahr, Akron, Ohio; J. C. Collins, Rochester, N. Y., and F. H. Sillick, co-chairman, New York City. Joint Transportation & Accountants' Associations committee on collection and registration of fares—M. W. Glover, co-chairman, Pittsburgh, Pa.; R. H. Stevenson, New Haven, Conn.; W. A. Doty, Denver, Col.; John J. Duck, Chicago, Ill.; F. E. Webster, Haverhill, Mass.; G. G. Kalweit, Milwaukee, Wis. Standing committee on standard classification of accounts—H. L. Wilson, chairman, Boston, Mass.; W. F. Ham, Washington, D. C.; W. H. Forse, Jr., Anderson, Ind.; R. N. Wallis, Fitchburg, Mass., and P. S. Young, Newark, N. J.

The annual report of the secretary-treasurer, Frank J. Davis, was then submitted and showed a growth of membership from sixty-one to sixty-two individual members and from 165 to 168 company members.

The Accountants' Association then adjourned to attend the joint meeting with the Transportation & Traffic Association on the subject of registration and collection of fares. The discussion at this meeting is reported under the proceedings of that association.

Tuesday's Session

At the opening of the second session President May announced the membership of the convention committees. He named as members of the committee on resolutions T. P. Kilfoyle, J. J. Duck and D. J. Strouse. As members of the committee on nominations M. W. Glover, W. E. Jones, H. L. Sanders, W. K. Zinsmeister and A. M. Curtiss.

The chairmen of the committees on claims accounting and engineering accounting stated they had nothing to report.

STANDARD CLASSIFICATION OF ACCOUNTS

The report of the committee on a standard classification of accounts was read by Secretary Davis in the absence of the chairman. The report stated that during the past year the committee had received either through the Interstate Commerce Commission or direct some thirty communications, some of which embodied several questions asking for decisions. With the exception of two cases, which are now pending, they have all been given attention.

Accounting Bulletin No. 14, the last issued by the Interstate Commerce Commission, was effective on May 1, 1917, and the committee some time ago suggested to Alexander Wylie, director of the Bureau of Accounts, that it would be advisable to publish a new bulletin embodying all decisions that had been made to date, but unfortunately, owing to the pressure of work upon his bureau in connection with the duties imposed by the transportation act of 1920, Mr. Wylie said it was necessary to defer such publication.

The committee also believed that the Standard System of Accounts, the text of which was prepared previous to 1914, had proved fairly satisfactory, but that time and experience had shown that there were portions, owing to changed conditions, that might be revised. This matter was also taken up with Mr. Wylie and for the same reason he believed a new edition could not be issued for some time. The committee is to keep these two matters in mind and is prepared to take up the work at the earliest date agreeable to Mr. Wylie.

It was a source of no little pride, said the committee, that the classification of accounts had been adopted so generally by the different state commissions and that bankers and others interested had shown confidence in the financial statements made in accordance with the rules laid down. It is beyond question that its general use has been of great help in improving public relations and has materially assisted in the proper presentation and consideration of the numerous rate cases that have been under investigation during the recent period of abnormal conditions affecting the electric railway industry.

STORE ACCOUNTING

A paper on store accounting as a means of stock regulation was presented by R. A. Weston of New Haven. The plans outlined followed to a large extent the recommendations of the Association of Railway Storekeepers. An abstract of this paper appears elsewhere in this issue.

B. J. Yungbluth, Philadelphia, in discussing the report stated that a similar system based very largely on this plan had been used for some years by the Pittsburgh Railways and had recently been established by the Public Service Company. The Philadelphia Rapid Transit Company is now installing a similar system. Good results had been obtained through the use of this system, and in some instances the amount of stock necessary to be carried had been materially reduced. Mr. Yungbluth also urged that the suggested plan be used to a greater extent by the electric railways, as it allows accounting officers to keep any records they choose, but absolutely puts it up to the storekeeper to know what he has on his shelves without any guesswork.

Mr. Weston in answer to several questions stated that this plan should not take the place of the regular inventory, which should generally be taken at least once a year.

On motion of T. P. Kilfoyle a committee of five is to be appointed by the incoming president to study and report on the subject of stores accounting.

COST-OF-SERVICE ACCOUNTING

The second paper presented was by H. J. Davies, Cleveland, on "Some of the Imperfections in the Cleveland Franchise," an abstract of which is also printed elsewhere in this issue. In answer to questions Mr. Davies stated that the property written off on retirement from service was not at the original investment figure but at reproduction new prices. This plan, he stated, was satisfactory only so long as prices for reproduction are in excess of the original cost. With falling prices, and he believes they are at hand, this plan of retirement of property will make the value of new additions less than the capital invested and the result will be overcapitalization.

Mr. Davies also outlined in detail the various steps in the attempt made by the company to secure a higher rate of return at the time the increase in wages of employees was granted, the final result being that the voters in referendum had refused by a vote of 35,000 to 10,000 to approve the action taken by the City Council in allowing a 7 per cent return. As a result of this the company is no longer able to float any stock at par for needed extensions and bonds cannot be sold at a discount unless the total interest and discount is kept within the 6 per cent requirement of the franchise.

Wednesday's Session

The closing session of the Accountants' Association was held on Wednesday afternoon. Two papers were read, the first of which was by Harry G. Mendes of Cleveland on financial problems confronting public utilities during the period of reconstruction. An abstract of this paper appears elsewhere in this issue.

The second paper was presented by George L. Vannais of Hartford on the accounting profession. An abstract of this paper is also printed elsewhere in this issue.

The committee on nominations next reported and on motion its selection for officers was voted. The officers elected were: President, J. J. Landers, auditor York (Pa.) Railways; first vice-president, F. E. Webster, vice-president and treasurer Massachusetts Northeastern Street Railway, Haverhill; second vice-president, W. G. Nicholson, secretary and auditor Omaha (Neb.) & Council Bluffs Street Railway; third vice-president, W. A. Doty, auditor Denver (Colo.) & Intermountain Railroad; secretary-treasurer, F. J. Davis, auditor's department Public Service Railway. P. L. King, auditor San Antonio (Tex.) Public Service Company; L. T. Hixon, Terre Haute, Indianapolis (Ind.), and Eastern Traction Company, and R. H. Stevenson assistant to comptroller the Connecticut Company, New Haven, were elected as members of the executive committee.

After the installation of officers the meeting adjourned, *sine die*.

Entertainments at the Convention

ALL the entertainments at the convention this year were at the pier with the exception of the ladies' obstacle golf tournament which was held on the lawn of the Marlborough-Blenheim Hotel. The evening entertainments consisted of the annual reception Monday night, informal dancing Tuesday night, the "County Fair" Wednesday night and the annual ball Thursday night. Of these, the most unique was Wednesday evening's entertainment, which was staged under the direction of R. C. Cram. Besides the main exhibition there were many side shows and opportunities for those so inclined to hit the African dodger, knock the cats from the fence or ring a cane. Only "bolshevik" money, with which the guests were freely supplied, passed current.

The ladies were entertained in the afternoon by a bridge tournament on Tuesday, with Mrs. W. F. Ham as hostess, an obstacle golf tournament on Wednesday with Mrs. Frank Donohoe as hostess and a tea Thursday afternoon with Mrs. John H. Pardee as hostess.

Meeting of Committee of 100

AT A meeting of the members in Atlantic City of the Committee of 100, held Tuesday afternoon at 4:30 in the Greek Temple, it was resolved to continue to function and that the work of the committee will be largely in the direction of the dissemination of information, as suggested by President Pardee in his address at the meeting of the association on Tuesday morning.

President Pardee presided at the meeting Tuesday afternoon, in the absence of General Tripp, who was detained by illness. H. G. Bradlee and B. C. Cobb were among those who advocated the plan adopted.

Public Representatives of Urban Transit

W. C. CULKINS

THE former American Association of City Representatives of Electric Railways met at the Traymore Hotel in Atlantic City on Oct. 13. The name of the organization was changed to Public Representatives of Urban Transit, as being more inclusive than the former name.

The officers elected for the coming year were: W. C. Culkins, Cincinnati, Ohio, president; Judge Fielder Sanders, Cleveland, Ohio, first vice-president; Carl D. Jackson, New York City, second vice-president; J. S. Goodwin, Detroit, Mich., third vice-president; delegates-at-large, W. S. Twining, Philadelphia, Pa.; Col. J. L. Wickes, Baltimore, Md., and M. M. O'Shaughnessy, San Francisco, Cal.; secretary-treasurer, C. R. Barnes, Rochester, N. Y. Messrs. Twining, Barnes and Sanders were appointed as a committee on constitution and by-laws. Robert P. Woods, formerly city member of the Kansas City Board of Control, now consulting engineer and also general manager of the Kansas City, Clay County & St. Joseph Electric Railway, was elected as the first honorary member. Following organization work the members had an instructive and animated discussion on their experiences in the operation of their local traction agreements. Plans were also started for a mid-winter meeting.

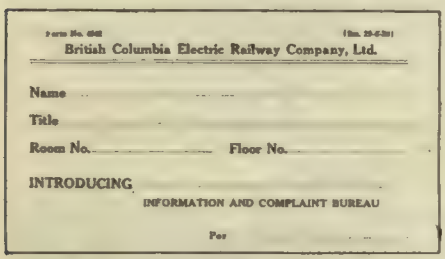
Celluloid tokens will shortly replace tickets on certain lines of the Glasgow Corporation Tramways. It was originally intended to make the change at the time of the recent increase in fares, but the manufacturers could not supply a sufficient number of the tokens at that time. The tokens will be accepted as payment for the two-stage fares. So far as is known this is the first occasion on which celluloid tokens have been placed in general circulation by a British tramway. They have been used previously by special classes of riders.

Vancouver Solves Information and Complaint Problem

Patrons of the British Columbia Electric Railway Show Increasing Appreciation of the Facilities Afforded Them

A DEPARTMENT of the British Columbia Electric Railway which has proved itself worth while during the past few months is the Bureau of Information and Complaint. This is located in a large booth at the Terminal Building. The accompanying illustration shows the bureau in action, but gives no idea of the volume of business transacted by it.

An actual count was made recently on an average day, after the bureau had been in operation for about two months, to determine the number of inquiries and complaints which were being handled and their nature. On this day there were 783 inquiries, an average of more than one a minute during the working hours between 8:30 a.m. and 8:30 p.m. These were answered by the bureau staff, consisting of two men. The questions were distributed thus: Regarding railway matters, 229; light and power, twenty-eight; gas six; miscellaneous, fifty-eight; referred to office upstairs (the company office being located in the terminal), twenty-three; calls on the two telephones, 428. The complaints regarding railway service numbered one; light and power, five, and, gas five.



Form No. [illegible] ([illegible])

British Columbia Electric Railway Company, Ltd.

Name

Title

Room No. Floor No.

INTRODUCING

INFORMATION AND COMPLAINT BUREAU

Per

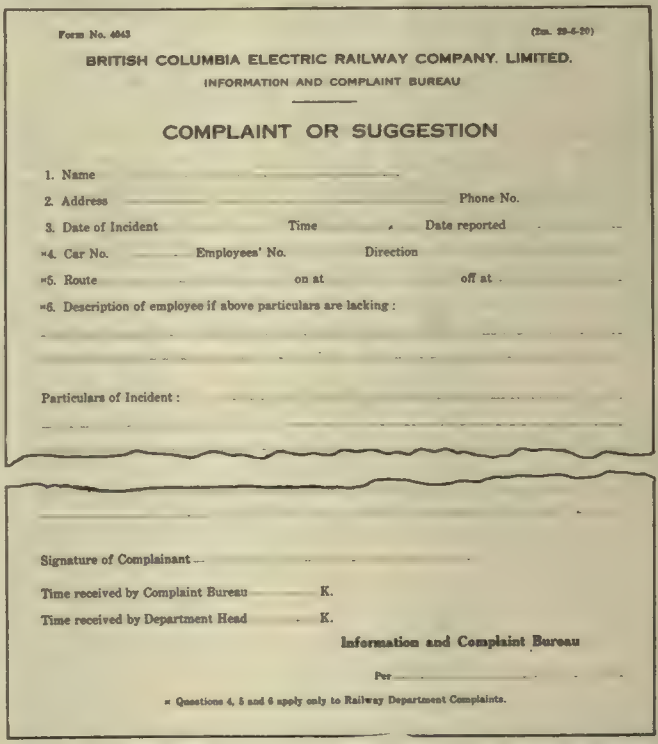
CARD USED IN INTRODUCING PATRONS TO COMPANY OFFICERS

Many of the queries and requests made of the bureau are amusing and serve to add interest to the work of the men connected with it. The following questions chosen at random will serve to indicate the nature of these requests: "When does the Chilli-wack train leave?" "What is the fare to Abbotsford?" "Where is Wall Street and how can I reach the 2500 block?" "When does the Victoria boat get in?" "Why is my light bill higher than my neighbor's?" "How often do the trains leave Victoria on the Saanich Line?" "How can I get to Ladner?" "Where is the best place to go fishing?" "When does the last ferry leave for North Vancouver?" "When does 'Teddy Lyon' (conductor of the company's sightseeing car) leave Robson and Granville?" "How is a good way to spend the evening?" "I've lost my daughter; she left here two hours ago on a Robson car; can you help me find her?"

PATRONS OF THE BRITISH COLUMBIA ELECTRIC RAILWAY, VANCOUVER, UTILIZING THE NEW INFORMATION AND COMPLAINT BUREAU

Entrance to waiting room at left and entrance to company offices at right.

One effect of the new bureau which the company officials noted is the increase in the number of complaints regarding service. This is due to the fact that the place where such complaints may be lodged is much more readily accessible than before. To illustrate, in June Assistant General Manager W. G. Murrin received sixty-seven railway department complaints as against forty-two in May. This was considered a very satisfactory result for the reason that, had the patrons not been able to lodge their complaints easily they would have nursed any resentment they had against the company, whereas a brief explanation might have cleared up the difficulty in almost every case.



Form No. 4043 (2m. 29-6-20)

BRITISH COLUMBIA ELECTRIC RAILWAY COMPANY, LIMITED.

INFORMATION AND COMPLAINT BUREAU

COMPLAINT OR SUGGESTION

1. Name

2. Address Phone No.

3. Date of Incident Time Date reported

*4. Car No. Employees' No. Direction

*5. Route on at off at

*6. Description of employee if above particulars are lacking:

Particulars of Incident:

Signature of Complainant

Time received by Complaint Bureau K.

Time received by Department Head K.

Information and Complaint Bureau

Per

* Questions 4, 5 and 6 apply only to Railway Department Complaints.

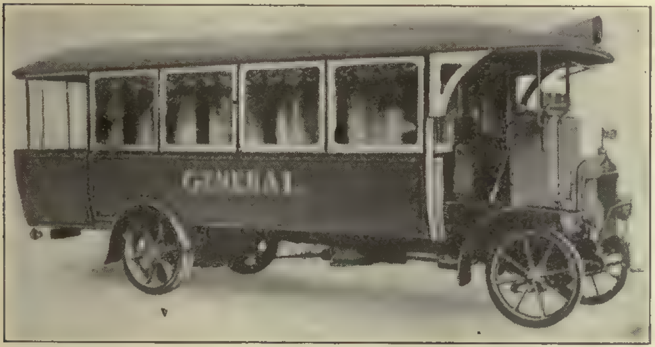
FORM USED FOR FILING COMPLAINTS AND SUGGESTIONS

The bureau also exerts a wholesome influence upon the departments affected by the complaints received. While many small misunderstandings which might never have come to light but for the convenience and accessibility of the bureau are satisfactorily cleared up at the wicket, a full report of all complaints is made to the management, and they are then directed to the officials affected, enabling them to determine and remedy the causes for complaint. Incidentally this acts as a check upon the efficiency of the departments concerned, for where a cause of misunderstanding or dissatisfaction has been thus brought to the attention of the official responsible, he cannot do otherwise than see that it is remedied and its recurrence prevented.

The Information and Complaint Bureau is well supplied with time-tables and other literature for distribution. In handling inquiries and complaints a few simple printed forms are used, of which two are reproduced. One is a 3 x 5-in. slip used in referring a complainant or inquirer to the proper company official when the matter cannot be handled by the bureau itself. The other is a letter sized form for filing complaints or suggestions in a rather formal manner.

A Camel-Back Motor Bus

THE Associated Equipment Company, designers and builders of the London General Motor Company's omnibuses, had a unique and new design of single-deck two-man bus on exhibition at the Antwerp Exposition.



A UNIQUE MOTOR BUS AT THE ANTWERP EXPOSITION

The driver is placed at the side of the engine, instead of behind, which increases the loading platform by 3 ft. 6 in. without adding to the over-all length of the bus. It also gives a more uniform distribution of weight between the front and rear axles and decreases the overhang of the body on the rear. A special spring is used which produces a very comfortable riding vehicle. The height of the top frame from the ground is 2 ft. 5 in. The chassis weighs about 3,000 lb. and will carry a total load of 7,000 lb., including the body, on the frame.

Another feature of the bus is the rear platform, which permits of twelve standees. The bus proper seats twenty-five, so there is a total capacity of thirty-seven. The roomy rear platform, the low step and the seating arrangement expedite loading and unloading passengers and the camel-back design permits the elimination of a bulkhead and a great reduction in weight, to say nothing of placing the driver closer to the traffic and eliminating a great deal of waste space found in earlier designs.

Steam Versus Electric Locomotives

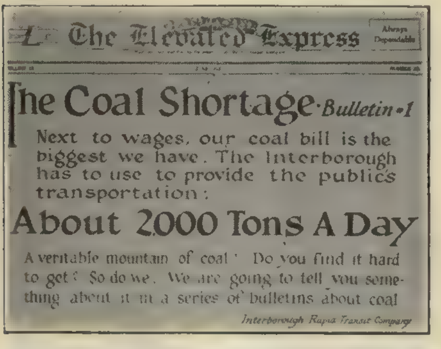
AT A JOINT meeting of the New York section of the American Institute of Electrical Engineers and the metropolitan and railroad sections of the American Society of Mechanical Engineers at the Engineering Societies Building on Oct. 22 a number of prominent engineers will discuss the relative advantages of modern steam and electric locomotives.

The subject will be introduced by Frank J. Sprague, consulting engineer. The advantages of electric locomotives will be presented by A. H. Armstrong, chairman electrification committee, General Electric Company, and F. H. Shepard, director of heavy traction Westinghouse Electric & Manufacturing Company, and the advantages of steam locomotives by John E. Muhlfeld, of the Railway and Industrial Engineers, Inc., and another speaker to be announced at the meeting.

The electric point of view will be discussed by C. H. Quinn, chief electrical engineer Norfolk & Western Railway Company; A. L. Ralston, mechanical superintendent New York, New Haven & Hartford Railroad; R. Beeuwkes, electrical engineer Chicago, Milwaukee & St. Paul Railway, and E. B. Katté, chief engineer electric traction New York Central Railroad, and the steam point of view by W. L. Bean, assistant general mechanical superintendent New York, New Haven & Hartford Railroad; A. W. Gibbs, chief mechanical engineer Pennsylvania System; F. H. Hardin, chief engineer of motive power New York Central Railroad and W. F. Kiesel, Jr., mechanical engineer Pennsylvania Railroad.

The discussion will be closed by George Gibbs, consulting engineer Pennsylvania Railroad.

Coal Story Told by Interborough


The Elevated Express
Always Dependable

The Coal Shortage · Bulletin 1

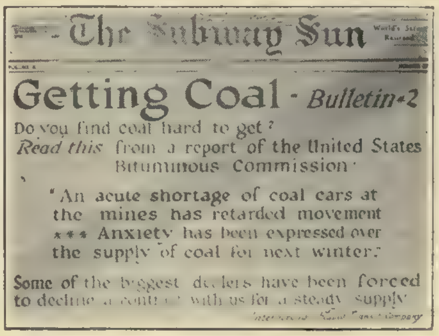
Next to wages, our coal bill is the biggest we have. The Interborough has to use to provide the public's transportation:

About 2000 Tons A Day

A veritable mountain of coal! Do you find it hard to get? So do we. We are going to tell you something about it in a series of bulletins about coal

Interborough Rapid Transit Company

The Interborough Rapid Transit Company has been telling the story of coal scarcity to the people of New York through a series of bulletins carried in the subway and elevated railway cars of its system. The series began with No. 26 of the "Subway Sun" and "Elevated Express" published during June, and ran through five issues of these bulletins. The entire series is reproduced for the benefit of other railway companies which may want to present the facts in regard to their coal supply to the public.


The Subway Sun
World's Safest Railroad

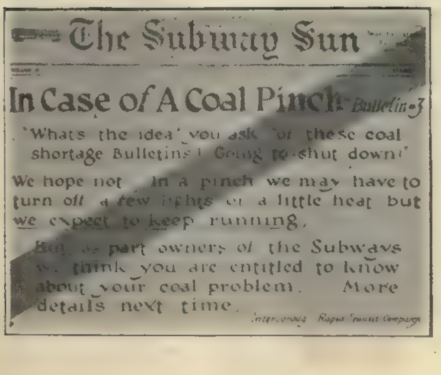
Getting Coal - Bulletin 2

Do you find coal hard to get?
Read this from a report of the United States Bituminous Commission:

"An acute shortage of coal cars at the mines has retarded movement *** Anxiety has been expressed over the supply of coal for next winter."

Some of the biggest dealers have been forced to decline a contract with us for a steady supply

Interborough Rapid Transit Company


The Subway Sun

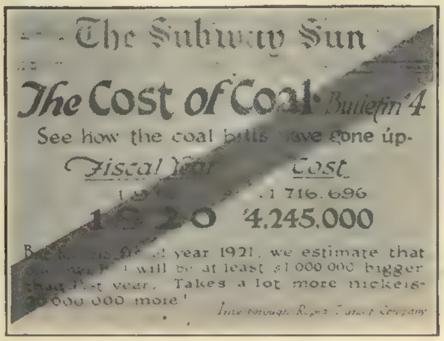
In Case of A Coal Pinch · Bulletin 3

"What's the idea," you ask, "of these coal shortage Bulletins? Going to shut down?"

We hope not. In a pinch we may have to turn off a few lights or a little heat but we expect to keep running.

But as part owners of the Subways we think you are entitled to know about your coal problem. More details next time.

Interborough Rapid Transit Company


The Subway Sun

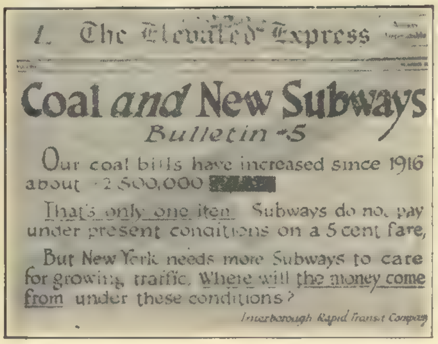
The Cost of Coal · Bulletin 4

See how the coal bills have gone up-

Fiscal Year	Cost
[illegible]	$1 716.696
1920	$4.245.000

B[illegible] fiscal year 1921, we estimate that [illegible] will be at least $1 000 000 bigger than last year. Takes a lot more nickels- [illegible]000 000 more!

Interborough Rapid Transit Company


The Elevated Express

Coal *and* New Subways
Bulletin 5

Our coal bills have increased since 1916 about $2,500,000 [redacted]

That's only one item. Subways do not pay under present conditions on a 5 cent fare,

But New York needs more Subways to care for growing traffic. Where will the money come from under these conditions?

Interborough Rapid Transit Company

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

City Will Run Lines

Plans to Take Over Staten Island Midland for One Year—Will Charge Nickel Fare

Mayor John F. Hylan of New York City will shortly be given an opportunity to try out his theories of municipal ownership. An agreement has been reached by Grover A. Whalen, Commissioner of Plant and Structures, and Jacob Brenner, receiver of the Staten Island Midland Railway, Richmond Borough, under which the city will take over the company's lines and will operate them beginning about Dec. 1. A 5-cent fare will be charged.

The plan provides in brief for taking over the property for one year. During the first six months the profits, if any, will go to the city, which will also have to make up for probable deficits. During the second six months the profits, if any, are to be divided evenly between the city and the company. A clause in the agreement provides that the Richmond Light & Railroad Company, which has been supplying electric current to the road, shall continue doing so at cost, which is to be fixed by an expert for the city and another for the company. If these two experts fail to agree Federal Judge Chatfield will decide the question.

City to Furnish Equipment

The city agrees to operate the cars on the schedules in force prior to the cessation of operation last January and to provide the necessary rolling stock and equipment to make this possible. It is also provided that either party to the agreement may terminate it on thirty days' notice.

The city has at its disposal $300,000 appropriated by the Board of Estimate for the purchase of rolling stock and equipment and to start the lines running. It was said on Oct. 9 that the Midland Company has only about half a dozen cars, and that if the city intended to operate on the schedules of last January it will be obliged to have at least twenty cars, which was the number owned by the company.

The Midland company, on the plea that it could not pay expenses with a 5-cent fare, ceased operating last January. This action followed much agitation on the part of the company, the Public Service Commission, the Staten Island public, the Board of Estimate and the various civic organizations. When Mr. Brenner was appointed receiver he tried to take possession of the company's property, but found very little of it. When he was urged to set the cars running he retorted that he could not find any cars.

The Board of Estimate ordered the company to resume operation, and its failure to obey the order resulted in a resolution passed by the board declaring the company's franchise forfeited. At the expiration of the ninety days required before such an order could become effective, action was delayed by the fact that the property was in the possession of the Federal court, that the company was bankrupt and that nothing could be done with it unless the court consented.

Service Resumption Called "Bluff"

Late in September the company resumed operation, but charged an extra 3 cents for passengers to and from St. George, because it operated for a short distance over the tracks of the Richmond Light & Railroad Company. Staten Island citizens objected strenuously to this and declared it was only a trick to save the franchise of the company from being forfeited and to enable it to obtain an 8-cent fare, which the Richmond company is charging by virtue of an order by the Public Service Commission. It was also charged that the receivers of the two railroads were acting as one and were in a plan to mulct the public.

Sixty Cents for Covington Men

After several weeks of investigation the board of arbitration which has been considering the demands of the employees of the Cincinnati, Newport & Covington Railway, Covington, Ky., for an increase in wages, has filed its report granting a 20 per cent advance in the wages of motormen, conductors, shopmen and power house men employed by the company. The report fixes the schedule at 56 cents an hour for the first three months; 57.6 cents an hour for the next nine months and 60 cents an hour thereafter. This is 1 cent an hour more than was recently granted by the Cincinnati Traction Company to its men. The board is composed of Judge John M. Lassing, representing the company; John M. Corbin, representing the carmen, and William L. Glazier, for the public.

Judge Lassing favored granting an 18 per cent increase and objected to granting the employees a higher increase than was given by the Cincinnati Traction Company.

The report recommends that the railway give up its perpetual franchises in Kentucky cities and that the officers of the company seek a conference with the city officials relative to obtaining a uniform franchise in all of the cities which will allow them to increase fares to improve the service.

Would Cost $97,000,000

Rapid Transit System for St. Louis Urged by City Plan Commission—Many Lines Needed

Recommendations for a system of rapid transit for St. Louis, Mo., which call for the utilization of the present Washington Avenue and Eighth Street railway tunnel and the construction of a subway system at a total estimated cost of $97,000,000 are contained in a report which has been submitted by the City Plan Commission of St. Louis to the Board of Public Service. The report, which is the result of a year and a half of study, is a comprehensive digest of the transportation problem confronting the city at present, and is also a frank analysis of the difficulties confronting the United Railways. It also contains much constructive criticism of conditions which have combined to bring about what the commission regards as an unsatisfactory system of transportation.

Would Abandon Some Lines

The plan calls for a gradual development of the local transportation system to meet the city's growth in the next ten to twenty-five years and also suggests a supplementary plan for a rapid transit system of subways and elevated tracks after the reorganized surface lines have been outgrown.

It is recommended that existing surface lines be rerouted, that some lines be abandoned and that new ones be built. These changes are discussed in detail. The construction program would be undertaken in three sections. It is suggested that the plan be carried out slowly for economic and physical reasons. The plan is somewhat similar to the plan submitted to the Department of Public Utilities recently by C. E. Smith, consulting engineer for the city. The cost, however, is estimated at $97,000,000, while the cost of executing Mr. Smith's plan would be approximately $200,000,000.

Many Districts Lack Service

At present 1 per cent of the city's area is more than one-quarter of a mile from a car line. Under the plan proposed this area would be reduced to less than 3 per cent. To accomplish this result many miles of single and double track would have to be constructed and 21 miles of single track and 23 miles of double track would have to be abandoned.

The report touches only briefly on finances. It opposes a uniform fare and points out that there is a tendency toward municipal credit and control in the operation of electric railways.

Seattle Mayor Asks Re-Deal

Demands Revision or Cancellation of Original Contract for Purchase of Lines—Sees $90,000 Monthly Loss to City

Mayor Hugh M. Caldwell of Seattle, Wash., in a recent public address went into details in regard to the municipal railway situation in Seattle and explained the city's peculiar position in operating a railway system in which it has not now, and will not have when the system is paid for, "one dollar invested." Mayor Caldwell stated that the contract entered into with the Puget Sound Traction, Light & Power Company was virtually written in its entirety by the attorney for the company, and was so written as to "protect the vendor." The Mayor expressed himself as in favor of rewriting or canceling the contract, but he would not make any definite statement as to the possibility of this being successfully done until he had completed his inquiry into the transaction. He declined to take the initiative in offering any suggestions to the City Council as to a change in the policy of the city in regard to the operation of the local transportation system.

THE Mayor said that Seattle is trying to do what no other municipal corporation ever attempted and what no public service commission would allow a privately-owned corporation to do, namely, make its patrons (the patrons of its electric railways) pay for the entire system, including depreciation charges, interest on investment and the capital invested.

MAYOR ASSAILS CONTRACT

Startling figures throwing light on what the street railway system would cost Seattle were given by Mayor Caldwell in support of his statement. He began with the capital investment of $17,215,000, made up, he said, of $775,000 of general bonds voted by the people, and of $16,440,000 in utility bonds which are a lien on the lines, and payable solely out of the receipts of the railway lines. A monthly depreciation charge of $56,415 has to be made against the lines by the State Bureau of Accountants, he said, which in the eighteen years required to pay off the principal will amount to a total of $12,185,776. This depreciation charge, according to City Comptroller Carroll and Mayor Caldwell, really does not exist. "No money has been paid in the depreciation fund," said Mayor Caldwell. In explaining this situation the Mayor said:

> In conferring with representatives of the State Bureau of Accountants I attempted to learn what should be done with this money, if any was in the fund. The bureau's suggestion was that the money be invested in income securities, a course I consider doubtful when the system is paying interest on its own bonds.

SEES $90,000 MONTHLY LOSS

At the rate of present expenditures by the city for upkeep and maintenance of the city lines, the Mayor said that at the end of the eighteen-year period the city will have put back into the lines in upkeep a total of $21,886,552. In discussing the item of depreciation, the Mayor used figures for August. In that month, the city spent approximately $100,000 for upkeep of the lines, but to this figure would have to be added the $56,000 monthly depreciation charge demanded by the State. As a result, August would show a net loss of $26,538. If the same plan is followed, he said, and adding the $64,000 a month which must be set aside beginning Jan. 1 next as payment on the principal, the city will be something like $90,000 "in the red" every month.

The Mayor arraigned the present agreement as follows:

> The present scheme is to have the car riders pay all operation, upkeep, maintenance, depreciation, dividends on capital investment, and retire the entire capital investment in eighteen years, at which time the car patrons will not own the lines, but they will belong to the corporation of the city of Seattle, which will at that time, under the present plan, not have invested a dollar therein. Even if we concede that those who ride upon the street cars are the only ones interested therein and that the merchants and property owners of the city find it of no financial benefit to them to have a going street car system, for which they would be willing to pay nothing, it is still a human impossibility successfully to navigate the fatuous course that we are now embarked upon. Shall we continue to raise the street car fares during the next eighteen years, until they reach a point where an insufficient number will ride on the street cars to make their operation worth while, or shall we give the Stone & Webster people a better contract than they made by making an entrance into the general fund in order to keep the system going?

Vacations for employees, a 5 per cent return on the capital—greater than the former owners of the line said they made—and other factors underlying the present situation were scored by the Mayor as contributing to the city's dilemma. The city, to date, according to the Mayor, has not had to pay any of the principal due on the bond issues. It is at the present time, however, paying out of its railway revenue all operating and maintenance expenses and is paying dividends of $72,138 a month on the capital valuation of $17,215,000. These dividends are being paid in the form of interest on bonds, that on the general bonds being 4½ per cent and 4¾ per cent; on all of the utility bonds except $100,000, 5 per cent; and on this $100,000 issue, 6 per cent. The Mayor said:

> These dividends, amounting to $865,658 plus per annum, are certainly much greater than were paid by the Puget Sound Traction, Light & Power Company before we took over its system. In addition to the dividends we are paying operating expenses, which for the eight months ending Sept. 1 amounted to $3,772,255. Included in this amount was the expense incurred in maintenance of track and structure, $308,507, and in the maintenance and upkeep of equipment, $502,105. In other words the amount that was set aside and used monthly for the upkeep of track and equipment averaged for the first eight months of this year, $101,325.

Mayor Caldwell called attention to the fact that under the contract of purchase of the lines the city agreed to pay all operating expenses and charges, including interest, out of the receipts and, moreover, agreed to pay the $15,000,000 out of the receipts at the rate of $833,000 a year, beginning March 1, 1921. Under these terms, he pointed out, the payment of the principal is made a first lien upon the gross receipts. The city is thus confronted with this situation:

> The depreciation charge which the State Bureau insists upon amounts to $676,987 a year; the principal to be paid the bondholders for the Puget Sound Traction system amounts to $833,000, exclusive of the interest, which is now $750,000 a year, but which will decrease in proportion to the number of annual payments on the principal. During the eighteen years that will be required to pay the principal the city will have charged as depreciation a total of $12,185,776. These figures indicate that the city will, during the eighteen years in question, have charged off the entire value of the lines, and will have put back into the system the sum of $21,886,552 for upkeep and maintenance, besides having retired the entire capital stock of $17,215,000.

The Mayor pointed out that the lines are being operated this year under a general wage increase of 11.38 per cent over the scale of August, 1919. The item of vacation expense was also referred to, the Mayor stating that the vacation expense for next year for the employees, giving them a vacation with full pay, will amount to about $100,000.

"DIVIDEND" OF 5 PER CENT

Mayor Caldwell referred several times to the fact that the private company, according to its own statements, at no time paid anything like 5 per cent on the capital invested. He stated that the company claimed that at no time during the last few years was it able to pay more than 3 per cent plus on the money invested. Also, under the system of charging depreciation by the private company, the charge was only a small amount compared to the $56,000 advised by the State Bureau of Accounts.

Mayor Caldwell pointed out that the number of passengers carried has fallen off, the figures for the month of August showing that 2,000,000 fewer persons were carried than during August, 1919. Notwithstanding this fact, the gross revenue for the month showed a net increase of $31,741. More than $16,000 of this amount was consumed in vacations, which were not a charge in 1919.

In referring to the jitney situation Mayor Caldwell stated that since thousands of people depend upon this form of transportation the city should not, in his opinion, abolish jitneys unless it can offer some other form of satisfactory and rapid transportation, merely to increase the revenues of the railway lines.

Calvin H. Hagan, financial expert, has written a letter to Mayor Caldwell in which he supports the stand taken by the Mayor. Mr. Hagan suggests the adoption of an amortization plan under which the city would be able to make the required payments for the railway lines and which he believes would be satisfactory to the Stone & Webster interests. No formal action will be taken by the Mayor until the completion of his investigation into the purchase of the property.

Utility Board Ousted

Governor Removes New Jersey Commissioners for Neglect of Duty—General Incompetency Charged

Gov. Edward I. Edwards of New Jersey on Oct. 14 removed from office upon charges of misconduct and neglect of duty the four members of the State Board of Public Utility Commissioners. At the same time the Governor appointed three members of a new commission and called a session of the State Senate for Oct. 19 to act upon his nominations. The three new commissioners are Col. Walter F. Whittemore, Republican, an engineer and a member of the State Highway Commission; Representative James A. Hamill, Democrat, a lawyer; and Arthur A. Quinn, Democrat, president of the State Federation of Labor.

The four commissioners removed from office are President John W. Slocum, George F. Wright, Harry L. Knight and Andrew Gaul, Jr., of Ridgefield. In announcing his decision, Governor Edwards sent the following letter to each of the ousted commissioners:

> You will please take notice that I have found and determined that you are guilty of neglect of duty and misconduct in office as a member of the Board of Public Utility Commissioners of this state and for this reason have and do now remove you from such office. A copy of the conclusions as reached by me is inclosed.

CHARGES BROUGHT BY CITY

The ousted commissioners were appointed by ex-Gov. Walter E. Edge. The board has long been under criticism. The complaint is that it has favored the Public Service Corporation as against the public interest. A year ago the town of Montclair preferred charges against the commission. Acting Governor Runyon heard those charges, but dismissed them. Then last spring Jersey City preferred other and more serious charges and it is on the basis of these that the Governor acted.

Summarizing his findings, Governor Edwards made the following statement:

> The facts disclosed in this case, upon which I have arrived at my conclusion, show not only that these men (the ousted commissioners) have been guilty of neglect of duty and misconduct in office, but they explain clearly why these men have lost the confidence of the public. The powers intrusted to this commission are extensive and affect not only the rights of the public, but the immense investments that have been made in the construction of these properties.
>
> The delays and vacillations of these commissioners have created a serious condition of doubt as to the safety of existing and future investments. It is as important to the capitalists who invest money in the construction of a public utility, and to the financial institutions which lend money upon the securities of public utilities, that there should be a definite rule of law and procedure, promptly and impartially applied, at all times, for the protection of these investments, as that there should be protection for the public against exactions of capital.

Among the outstanding charges sustained by Governor Edwards as cause for the removal of the commissioners were failure to require setting aside of adequate depreciation accounts; favoritism and bias toward subsidiary companies of the Public Service Corporation; delay in valuing the property of the Public Service Railway and the Public Service Electric companies; fixing increased retroactive rates for the Public Service Electric Company; establishing seven rates on Public Service Railway lines in one year without sufficient reason; failure to recommend changes in the utilities law shown to be necessary by experience; permitting diversion of proceeds of bond issues to the account of working capital; establishing unnecessarily long and extensive processes; retention of experts biased toward corporate interests, and discrimination in granting promptly applications of public service companies and delaying decisions in other cases.

Governor Edwards began his conclusions by meeting the arguments of counsel for the commissioners that he lacked power to remove them from office. He took the position that if such action on his part was an invasion of judicial powers vested in the courts, it would be equally an assumption of judicial power for him to hold the public utilities act unconstitutional. On this point the Governor said:

> The first answer to the objection is that the statute establishing the Board of Public Utility Commissioners provides that the Governor may remove any commissioner for neglect of duty or misconduct in office, giving to him a copy of the charges against him and an opportunity of being publicy heard in person or by counsel in his own defense upon not less than ten days' notice. The legislative intent, therefore, is clear, and that is not questioned by the counsel for the accused commissioners.
>
> If I decline to consider charges against these commissioners, or if I find them guilty and neglect to remove them, it is plain that I am violating a duty laid upon me by the Legislature. I am unwilling in this case to take the responsibility of declaring this provision of the public utility act unconstitutional.

Receivers Denied Increased Compensation

An application by the three receivers of the Rhode Island Company, Providence, R. I., for increased compensation on account, has been denied by Judge Chester W. Barrows in Superior Court. The receivers, Frank H. Swan, Theodore Francis Green and Zenas W. Bliss, presented the petition asking for an increase of $450 each a month, through their attorney, Clifford Whipple.

The receivers of the Rhode Island Company were each allowed $12,000 on account for the first year of the receivership when the matter came before Presiding Justice Tanner for a hearing, no one having presented any objections to the sum fixed by the court. In their petition presented to Judge Barrows recently, the receivers asked for an allowance of $1,450 each a month on account, for the period of seven months which has elapsed since the last settlement was made.

In arguing for increased compensation, Mr. Clifford reminded the court that at the time the receivership was established prospects for an early reorganization of the railway was very bright, but that with the present uncertainty of the situation the receivers should be allowed compensation more nearly approaching the sum that would finally be requested.

Eight Cents in New Orleans

Advance in Fare Adopted as Means of Averting Threatened Strike—Wage Award Met

Beginning Oct. 21, the people of New Orleans, La., will be charged 8 cents for car fare. This decision was reached by the Commission Council, at the instance of a committee appointed by the board of directors of the Association of Commerce, after a long drawn out conference with Assistant Attorney General Hall, Major Behrman and Receiver O'Keefe, of the New Orleans Railway & Light Company, as the only alternative to prevent another strike of trainmen.

Mayor Behrman was unwilling to give the men the award made by the Special Masters, awarded by Federal Judge Foster, before giving the public a hearing in the matter, being undecided in his mind whether a strike or an 8-cent fare would be more expensive to the Community.

EIGHT-CENT FARES FOR SIX MONTHS

The representative of the men and attorneys alleged, however, that the men were insistent on the carrying out of the award made to them by the Special Masters and that unless the matter was decided forthwith and the award executed, they could not be restrained in their determination to abandon work. It was hinted their course would be followed by the employees of the gas light company, a contingency which would make the strike all the more trying and vexatious, since it would curtail one of the city's chief sources of power, heat and light.

The agreement provides that an 8-cent fare shall be charged from Oct. 21, for a period of six months, leaving to the incoming administration the solution of the service-at-cost plan, the valuation of the property and other controvers in question.

Accidents Decreased in Seattle

In a report by D. W. Henderson, general superintendent of the Seattle (Wash.) Municipal Railway, marked reduction is shown in the number of accidents on Seattle's railway lines. In the first eight months of 1920, accidents were cut down from 3 to 53 per cent in all classes. The effects of weekly conferences for instruction and caution conducted by Mr. Henderson are reflected in the report. The percentage of claims against the gross earnings for accidents are said to be considerably less in Seattle than in other cities of the country of the same class, with one or two exceptions, and these in cities where railways are operated on level streets. The report gives the following table covering eight months of 1919 and 1920:

	1920	1919	Reduction Per Cent
Car collisions	172	368	53
Auto collisions	2016	2446	17
Pedestrians	135	210	35
Accidents on cars	204	312	35
Step accidents	341	352	3
Derailments	166	205	19
Ejectments	70	82	15

Men Accept Five-Cent Advance

The 800 employees of the Middlesex & Boston Street Railway, Newtonville, Mass., have accepted the company's offer of a wage increase of 5 cents an hour. The old agreement under which the men have been receiving 45, 50 and 55 cents per hour, according to term of service, expired on June 30. The men then submitted demands for 75, 80 and 85 cents. It is understood that the increase will be retroactive. The company announced that an increase of 5 cents an hour will not necessitate a fare increase. Pitt F. Dred, president of the company, in a statement regarding the acceptance of the increase, said:

> I am very glad to learn that the men have voted to accept the increase offered by the company. I have always had a strong conviction that the great majority of the men on our system are intelligent, level-headed and reasonable, men ready to do what they believe to be right and fair when they are in possession of all the facts. For this reason I refused to make an offer to their committee unless they would send an accountant to examine our books and report the facts to the men.
>
> The cost to the company is more than should be paid from a business standpoint and I believe the men realized it. On the other hand they, no doubt, felt that they too were making a sacrifice. It is this spirit of fairness and co-operation on the part of the men that gives me courage.
>
> We have been passing through very hard times for the management and for the men, to say nothing about the patient and unfortunate stockholder. The men agreed with me that it would be unfortunate to have a raise in fares and certainly no general increase will be asked for until we have made every reasonable effort to work the proposition out on the present basis.

News Notes

Demand That Service Be Restored.—An ordinance requiring the Atchison Railway, Light & Power Company, Atchison, Kan., to resume service on its lines or to pay a forfeit of $500 a day has been passed by the City Council. The road has recently been tied up by a strike.

Begin Work on Vehicular Tube.—Ground was broken on Oct. 12 for the vehicular tube under the Hudson River which is to connect Manhattan Island, New York City, with the state of New Jersey. Gov. Edward I. Edwards of New Jersey and Lieut.-Gov. Harry C. Walker of New York attended the ceremony. The cost of the project is estimated at $28,000,000.

Labor Shortage Halts Improvements.—A shortage of labor in Dallas, Tex., is seriously interfering with the improvement work being carried on by the Dallas Street Railway. Richard Meriwether, vice-president and general manager, recently stated that, in spite of the fact that the company was paying 40 cents an hour to common laborers, sufficient help of this class could not be obtained. Work on various betterments is therefore being delayed.

Interurban Tie-up Ends.—A strike which tied up the lines of the Northwestern Ohio Railway & Power Company, Toledo, Ohio, operating interurban trains between Toledo and Marblehead, Ohio, ended on Oct. 8 when trainmen returned to work, adjustments having been perfected on a new time schedule which caused the trouble. Trainmen brought from Cleveland to operate the cars have returned. The strike began on Oct. 3.

Towns Would Take Over Line.—The towns and villages served by the Exeter, Hampton & Amherstburg Street Railway, Hampton, Mass., have opened negotiations with the company with a view to taking over its system for joint municipal operation. The company some time ago announced its intention of closing its lines and removing the tracks because of lack of funds. The State Department of Public Utilities has fixed $105,000 as fair value of the property.

City Ownership Favored. — Acquisition of the property of the Ottawa (Ont.) Electric Railway by the city of Ottawa is proposed in a report recently submitted to the City Council by the Board of Control. The board recommends that the rate-payers pass upon the question of the city's taking over the system at a referendum election to be held in January. If the voters should approve the proposition, the Council would have the power to ask the Provincial Legislature to grant permission for the city to borrow the necessary funds without a second appeal to the rate-payers.

Service Not Quite Normal.—Complaints from the officers of civic organizations, churches and schools in Brooklyn, N. Y., that as a result of the recent strike the Brooklyn Rapid Transit Company is still withholding surface cars from a number of important lines have been filed with the Public Service Commission for the First District. During a hearing on the complaints the company produced a letter from Federal Judge Julius M. Mayer, addressed to W. S. Menden, general manager of the B. R. T., which showed that the Federal Court was not only cognizant of the lack of street-car service, but had authorized it.

Big Toledo Vote Forecast.—W. L. Milner, author of the new service-at-cost franchise for the Toledo Railways & Light Company, which is to be submitted to the voters of the city at the general election on Nov. 2, is leading a campaign for the passage of the measure. He has addressed several public meetings, among them a rally at the Women's Building, which was largely attended by women. So far registrations have indicated that there will be a vote of more than 75,000 on the ordinance and on the twin bond measures for municipal ownership, as compared with a total of little more than 20,000 at the last election. The Toledo Railways & Light Company is taking no active part in the campaign in behalf of the service-at-cost measure.

Program of Meeting

National Association of Railway & Utility Commissioners to Hold Convention Nov. 9

The thirty-second annual convention of the National Association of Railway & Utilities Commissioners will be held at Washington, in the rooms of the Interstate Commerce Commission, on November 9, 1920, at 10 o'clock. The convention will last four days.

The address of welcome will be delivered by Edgar E. Clark, chairman of the Interstate Commerce Commission. Other addresses will be delivered by President Shaw, Clyde B. Aitchison of the Interstate Commerce Commission and George W. Anderson, a former member of that commission and now Judge of the United States Court in Massachusetts.

DISCUSSION OF PUBLIC OWNERSHIP

Among the subjects to be treated are: Public ownership and operation, safety of railroad operation, safety of operation of public utility companies, railroad service, accommodations and claims, railroad rates, public utility rates, car service and demurrage, express companies, statistics and accounts, grade crossings, capitalization and state and federal legislation. When these reports are presented they will be discussed upon the floor of the convention, and commissioners from various states will exchange views.

As a departure from the usual program, the convention this year will devote the afternoon sessions on Nov. 10 and 11 to informal or round-table discussions of a number of topics, among them "Local Street Railway and Interurban Transportation." The chairman of this meeting will be Charles E. Elmquist, of Minnesota, who headed the Federal commission which investigated the street railway situation early in the year. Among the speakers will be E. O. Edgerton, of the California Commission, and Noah W. Simpson, of the Missouri Commission.

WOULD SAFEGUARD POWERS

Attention is called to the efforts to minimize the influence of the state commissions, and the movement by certain interests to seek freedom from state control. On this subject the call says:

> This association has not and never can have any quarrel with Federal regulation in the field of Federal jurisdiction. It has repeatedly placed itself on record as in favor of the closest co-operation between the states and the Interstate Commerce Commission. But it resents the efforts of those who seek to curtail the rightful powers of the sovereign states over strictly intrastate matters.
>
> Against attempts to disarm the states this association must be constantly on its guard. It is only fair to state that the Interstate Commerce Commission itself has not shown any disposition to encroach upon the state field, and its chairmen frequently have urged closer co-operation between Federal and state commissions. In the recent advanced rate case three state commissioners selected by this association at the invitation of the Federal commission sat with it. The association is earnestly desirous of continuing these harmonious relations, but will stand firm, in the future as in the past, for the right of each state to control in matters of purely local regulation.

Financial and Corporate

Income Drops 200 per Cent

Railways in New York City Report Decline from Profit of $5,000,000 to Deficit of $5,000,000

For the year ended June 30, 1919, the provisional report issued by the Public Service Commission for the First District, covering the railways in New York City taken as a whole, shows that the net corporate income changed more than $11,000,000. The net income for 1918 was $5,780,958 as compared with a deficit of $5,583,820 for 1919, or a decrease of very nearly 200 per cent. The large decrease is due to the increased cost of materials and operations with no increase in fares. The operating revenues increased only about $7,000,000, or 6.5 per cent over 1918. At the same time the total operating expenses increased twice as much as did the revenue.

This increase was more than $15,000,000, or 25.2 per cent over 1918. This allowed the net operating income to fall approximately $8,000,000 short of the same item in 1918. The taxes were decreased slightly and the non-operating income remained the same, so the gross income was decreased $8,500,000 over 1918. Deductions from the gross income increased approximately by $3,000,000, thereby making the total difference in the net corporate income for the two years was very close to $11,000,000.

In 1919, 77,811,385 more passengers were carried than in 1918, an increase of 3.4 per cent. At the same time the car miles increased about 12,000,000, or 3.6 per cent over 1918.

TRAFFIC AND MISCELLANEOUS STATISTICS OF NEW YORK CITY COMPANIES

Year Ended June 30:	1919	1918	Percentage Change
Miles of track, exclusive of storage and yard track	1,793.21	1,733 82	3.4
Average daily maximum number cars operated (June)	8,480	8,013	5.8
Passenger car-miles (active)	334,938,289	322,957,219	3.7
Car seat-miles	16,823,199,459	15,889,141,428	5.9
Total revenue car-miles	341,342,293	329,538,712	3.6
Passenger car-hours	28,591,562	28,939,839	— 1.2
Ratio C.M. to C.H. (speed M.P.H.)	11.7	11.2	45
Revenue passengers	2,079,754,393	1,975,511,690	5.3
Transfer passengers	293,988,420	320,419,738	— 8.3
Total number passengers	2.373,742,813	2,295,931,428	3.4
Operating ratio	69.0	58.5	10.5
Statistics per car-mile	11.7	11.2	
Operating revenue (cents)	32.3	31.5	2.5
Operating expenses (cents)	22.3	18.4	28.1
Net income (cents)	1.64	1.76	— 6.8
Number of passengers (total)	7.0	7.0	.....
Car-miles per revenue passenger	164.0	166.7	— 1 6
Statistics per car-hour:			
Operating revenue	$3.85	$3.58	7.5
Operating expenses	$2.65	$2 09	26.8
Net income (cents)	19.5	20.0	— 2 5
Number of passengers (total)	83.1	79.4	4.7

EARNINGS OF NEW YORK CITY COMPANIES

Year Ended June 30 (Provisional):	1919	1918	Percentage Change
Passenger revenue	$103,199,657	$97,394,225	6.0
Other transportation revenue	710,594	545,943	30.2
Total revenue from transportation	$103,910,251	$97,940,168	6.1
Other railway operating revenue	6,281,431	5,560,021	13.0
Total railway operating revenue	$110,191,682	$103,500,189	6.5
Operating expenses:			
Maintenance expended	$20,898,872	$16,007,110	30.6
Depreciation reserve	Cr. 2,112,793	96,617	—2279.0
Operation of power plant	14,590,859	11,195,756	30.4
Operation of cars	34,507,458	26,209,281	31.6
Injuries and damages	.4,340,019	3,751,412	15.7
Traffic and general expenses	3,721,297	3,346,362	11.2
Total operating expenses	$75,945,712	$60,606,539	25 2
Net operating income	$34,245,970	$42,893,650	—20.2
Street railway taxes	7,909,679	8,232,322	— 3.9
Operating income	$26,336,291	$34,661,328	—24.0
Non-operating income	4,247,358	4,498,531	— 5.6
Gross income	$30,583,649	$39,159,859	—21.9
Deductions from gross income			
Interest	$18,317,105	$16,902,067	8.4
Rents	16,097,054	15,802,682	1 9
Miscellaneous	1,753,310	674,152	160.0
Total deductions from gross income	$36,167,469	$33,378,901	8.4
Net corporate income	*5,583,820	5,780,958	—196.4

* Deficit.

Ticket Ratio Declines

Chicago "L" Reports Results of 10-Cent Fare—32 per Cent of Riders Now Pay Cash

The figures for the first month's operation of the Chicago Elevated Railways under the 10-cent cash fare, with four tickets for 35 cents, which went into effect on Aug. 4, are now available. During August of this year 15,025,599 passengers were carried, with a resulting revenue of $1,370,864.

SMALL FALLING OFF IN PASSENGERS

This compares favorably with the month of August, 1919, the rate of fare then being 8 cents, when 13,578,959 passengers were carried, producing a revenue of $1,063,068. In July, 1920, when the rate of fare was 8 cents cash with two tickets for 15 cents, the number of passengers carried was 17,024,667, the passenger revenue amounting to $1,319,677.

During July, 1920, 4,204,932 passengers, or 25 per cent of the total number carried, paid the cash fare of 8 cents. During August, 1920, 4,826,697 passengers, or 32 per cent of the total, paid the cash fare of 10 cents.

While the number of passengers carried in August was practically 2,000,000 less than the number carried in July, the falling off is attributed more to the fact that July was an abnormal month than to the increased rate of fare. The number of passengers carried in June, 1920, which was 15,659,350, would probably be a better figure with which to compare the number carried in August, 1920.

REASON FOR DECREASE

This would show a reduction of about 600,000 passengers, which might be reasonably attributed to the higher rate of fare, as this many might easily be driven to the steam road suburban service and the surface lines, the latter having an 8-cent cash fare.

Scranton Valuation Fixed

A report has been filed with the Pennsylvania Public Service Commission fixing the physical valuation of the Scranton Railway. The valuation figures were determined by Drum & Company, Chicago, engineers, who represented the railway, and Dr. F. Herbert Snow, engineer for the commission. These figures, as submitted to the commission, are: Valuation on Nov. 1, 1919, $9,049,264; average for 1914 to 1912, $6,876,891; for year of 1914, $5,543,216. The historical valuation is placed at $11,319,156.

Attempts were made by complainants in the case to show that the high price area has passed and prices are dropping, and that there is considerable inflation in the country today.

The valuation of the property of the Scranton Railway was ordered by the commission in April, 1919, when it authorized the company to charge a 7-cent fare. It recently refused the petition for a 10-cent fare.

St. Louis Deficit Decreased

United Railways, in Receivership, Decreases Its Deficit From $400,000 in 1918 to $265,800 in 1919.

The results of the operation of the United Railways, St. Louis, Mo., in the hands of a receiver, show some improve- for the year ended Dec. 31, 1919. The revenue from passenger traffic increased by nearly $3,000,000, or 21.8 per cent over 1918. The improved showing was due largely to an increase of 32,024,602 in passengers carried, bringing the total of 376,985,727 passengers in 1918 up to 409,010,329 in 1919, or 8.5 per cent more.

Operating expenses were $16,592,680, an increase of 26.4 per cent over 1918. Taxes increased 30 per cent. Gross income increased $277,424 and deductions from the gross income increased $142,905. The net income transferred to profit and loss increased $134,519. The net income for 1918 was $400,299. The deficit for the year 1919 was only $265,780.

The Public Service Commission awarded, effective Sept. 20, 1919, cash fares of 8 cents for adults and 4 cents for children, with the sale of adult tickets at two for 15 cents, seven for 50 cents, and fifty for $3.50, and children's tickets at the rate of two for 7 cents. It was found impossible to secure the necessary number of metal tickets (over 4,000,000 being needed) on Sept. 20, 1919, and a flat rate of 7 cents was charged from that date until Oct. 31, 1919. On Nov. 1, 1919, bronze tickets, two for 15 cents, were sold on the cars only, and alloyed-silver tickets, in greater quantities, were sold at some 800 different stations. The result was that fares gradually settled down to a basis of approximately 3 per cent cash fares, 35 per cent 7-cent tickets sold off the cars, and 62 per cent of 7½ cent tickets sold on the cars. For the first few weeks traffic fell off on account of the increase in fares, but this was more than offset by the increased proportion of fares turned into the treasury and by increased business activity.

INCOME STATEMENT UNITED RAILWAYS OF ST. LOUIS

Year Ended Dec. 31:	1919	1918	Percentage Change
Revenue from transportation	$16,497,932	$13,551,542	+21.7
Revenue from other railway operations	94,748	88,077	+ 7.6
Total railway operating revenue	$16,592,680	$13,639,619	+21.7
Current operating expenses	11,533,460	9,126,513	+26.4
Net operating revenue	$5,059,220	$4,513,106	+12.1
Taxes assignable to railway operations	1,110,911	852,476	+30.3
Operating income	$3,948,309	$3,660,630	+ 7.9
Non-operating income	106,442	116,697	— 8.8
Gross income	$4,054,751	$3,777,327	+ 7.4
Deductions from gross income:			
Interest and miscellaneous charges	2,661,263	2,540,872	+ 4.7
Depreciation reserve	1,659,268	1,636,754	+ 1.4
Total deductions from gross income	$4,320,531	$4,177,626	+ 3.4
Net income transferred to profit and loss	*$265,780	*$400,299	+33.6

*Deficit

STATISTICAL INFORMATION —UNITED RAILWAYS OF ST. LOUIS

Year Ended Dec. 31:	1919	1918	Percentage Change
Revenue passengers	263,221,899	245,876,910	+ 7.1
Transfer passengers	145,788,430	131,108,817	+11.2
Total passengers	409,010,329	376,985,727	+ 8.5
Percentage of revenue passengers using transfers	55.39	53.32	+ 3.9
Passenger revenue	$16,463,312	$13,516,790	+21.8
Average fare per revenue passenger (cents)	6.25	5 50	+13.6
Total miles of single track	461.57	460.90	+ 0.1
Amount track reconstruction, renewal and extension	25.01	15.80	+58.3
Total kilowatt-hours	179,011,395	174,686,259	+ 2.5
Number passenger cars owned	1,460	1,480	— 1.4
Average number passenger cars operated daily	1,132	1,107	+ 2.3
Number of employees	5,605	5,295	+ 5.9

Interest Payment Authorized

An order for the payment of interest by the receiver of the United Railways, St. Louis, Mo., on bonds of the St. Louis Transit Company and the St. Louis & Suburban Railway, amounting to $357,250, has been issued by Judge C. B. Faris in the United States District Court at St. Louis. The bonds bear 5 per cent interest which fell due on Oct. 1. St. Louis Transit Company bonds total $9,790,000 and the St. Louis & Suburban Railway bonds amount to $4,500,000.

Judge Faris also issued an order granting the receiver an extension of time in which to annul or adopt contracts of the United Railways. The orders were issued as a result of petitions asking six months' extension for the United Railways, the Florissant Construction & Investment Company, the Merchants' Express Company, and the Missouri Electric Company, all of which are in the hands of Rolla Wells, as receiver.

The United Railways was granted the right to enter into a contract with the Union Electric Light & Power Company for steam-generated current. The contract which the company now holds expires on Dec. 31, and the new contract will begin Jan. 1 and run for three years. Through the terms of the contract the United Railways will pay $15 per kilowatt per annum plus the energy charge of 89 cents per kilowatt hour. The energy charge is subject to change under the contract.

New Haven's Trolley Ventures Costly

The sale at auction of the New York, New Haven & Hartford Railroad's 96,855 shares of the Rhode Island Company, carried at a book value of over $24,000,000, for $2,200 marks a final chapter in the New Haven's venture in New England trolleys. The Boston *News Bureau* explains as follows:

> It has for some time been apparent to the New Haven people that practically a total loss would have to be sustained on the Rhode Island street railway investment. The trolley situation there has gone from bad to worse. The outcome is not a surprise but it is sad commentary on the status of street railways in some parts of New England.
>
> In additional to the original investment which was carried at slightly over $251 per share the New Haven had advanced the Rhode Island Company $3,746,037 in loans and held notes for that amount so that the total investment was above $28,000,000, as shown below:

	Par value	Book value
Stock	$9,685,500	$24,352,336
Notes	...	3,746,037
Total	...	$28,098,373

> The Rhode Island Company was incorporated by special act of the Rhode Island Legislature in April, 1902, to consolidate all the street railway, gas and electric light properties of Providence and vicinity. It operated over 354 miles of street railway and 8.41 miles of steam railroad lines. Of the total mileage 39.93 miles were owned and 322.64 operated under lease.
>
> Under the government dissolution decree for the New Haven the stock and obligations of the Rhode Island Company were put in the hands of trustees who were to exercise their best efforts to complete the sale of the securities before July 1, 1919. in March, 1919, however, Federal Judge Mayer extended the period during which the trustees might dispose of the securities to July 1, 1921.
>
> New Haven's other big trolley investment—the Connecticut Company—should work out considerably better than the Rhode Island venture. It carries the 400,000 shares of stock of the Connecticut Company at $40,000,000 book value and holds over $3,000,000 notes and debentures of that company.
>
> It is obvious that it will have to take a large loss on this valuation but should be able to salvage a portion of its investment here. Trolley conditions in Connecticut are not entirely satisfactory but a great deal has been done toward establishing street railways on a paying basis.
>
> The New Haven's total investment in trolley, electric light and properties of similar character aggregates about $106,000.000. On a portion of this it will undoubtedly be able to realize to substantial degree, but even assuming that the whole amount had to be written off, the New York, New Haven & Hartford Railroad could show, on the basis of cost of reproduction and bare original cost of land, an equity above all obligations equal to $133 per share on the $157,000,000 stock.

Power Bonds Offered

William A. Read & Company and Spencer, Trask & Company, New York, N. Y., are offering for subscription at 99 and interest $5,000,000 of Wisconsin Electric Power Company first mortgage 7½ per cent sinking fund gold bonds, Series A, dated Oct. 15, 1920, and due Oct. 15, 1945, principal and interest guaranteed by indorsement by the Milwaukee Electric Railway & Light Company.

All Bids Rejected

Court Refuses Tenders for Buffalo & Lake Erie Property—Road to Quit Nov. 30

Upon the recommendation of George Bullock, as receiver for the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., Supreme Court Justice Louis W. Marcus has rejected all of the bids for the purchase of the property of the company. The court has authorized the receiver to continue the operation of the line until midnight of Nov. 30, 1920.

Justice Marcus reserves final disposition of the application of the receiver of the road to dismantle the property. Included in the order of the court is a provision authorizing the receiver to operate over the lines of the company after Nov. 30, such cars or trains as will be necessary for the purpose of disposing of freight then on hand and of closing up the stations and of collecting property belonging to the railway.

Further advertisements for bids will not be postponed, but the receiver is authorized to conduct such further negotiations looking to the sale of the property as he may deem desirable and to report to the court the result of the negotiations.

The proceedings were brought originally by the New York Trust Company, New York City, against the Buffalo & Lake Erie Traction Company, Buffalo; the Erie Electric Motor Company, Erie, Pa.; the Erie City Passenger Railway, Erie, Pa.; the Erie, Reed Park & Lakeside Street Railway and the Buffalo & Lackawanna Traction Company.

Would Rehabilitate Binghamton Lines

It is reported that persons interested in the receivership of the Binghamton (N. Y.) Railway are attempting to secure funds to be used in the rehabilitation of the system, and that their efforts promise to be successful. The proposed refinancing will carry with it the raising of sufficient funds to pay in full bonds aggregating $500,000 due in 1923. Receiver Phelps has announced that he expects to pay the interest on the company's consolidated mortgage bonds, due Nov. 1, amounting to $40,000. Federal Judge George W. Ray in an order issued several months ago directed that in the period ending Oct. 30 the receiver should pay off certain debts of the company. This order also provided for the ultimate discharge of the receiver.

Interborough Deficit Decreased

The Interbourough Rapid Transit Company, New York, N. Y., for the month of August, 1920, shows a deficit for its net corporate income of $658,482 against a deficit of $632,976 for the corresponding month of last year. For the two months ended Aug. 31, 1920, there was a deficit of $1,201,908. This was a decrease of 15 6 per cent over the same period last year. For the month of August, 1920, the number of passengers carried increased more than 10,000,000, or 17 per cent over the number carried in the same month of 1919. For the two months' period ending Aug. 31, 1920, the revenue passengers per car mile increased from 131,350,416 to 150,587,186, or 14.6 per cent.

SUMMARY OF EARNINGS OF INTERBOROUGH RAPID TRANSIT COMPANY

Month ended Aug. 31, 1920	1920	1919	Percentage Change Over 1919
Total operating revenue	$4,032,388	$3,482,685	15.8
Total operating expenses	2,812,626	2,285,582	23.0
Net operating revenue	1,219,763	1,197,103	1.9
Total taxes	215,752	211,114	2.2
Operating income.	1,004,012	985,989	1.8
Non-operating income	51,940	45,046	15.3
Gross income	1,055,952	1,031,034	2.4
Interest, rentals, etc., including Manhattan guarantee	1,714,434	1,664,010	3.0
Net income	*$658,482	*$632,976	4 1
Operating ratio (per cent)	69 75	65.63	6 2
Revenue passengers carried	74,797,650	63,988,828	17.0
Two months ended Aug. 31, 1920	1920	1919	Percentage Change Over 1919
Total operating revenue.	$8,116,013	$7,122,071	13.9
Total operating expenses	5,576,796	4,518,990	23.5
Net operating revenue	2,539,218	2,603,081	2.5
Total taxes	435,769	427,073	2 0
Operating income	2,103,448	2,176,008	3.4
Non-operating income	104,478	91,961	13 7
Gross income	2,207,927	2,267,969	2.6
Interest, rentals, etc., including Mahnattan guarantee	3,409,834	3,307,453	3.1
Net income	*$1,201,907	*$1,039,485	15 6
Operating rat'o (per cent)	68 71	63 45	8 2
Revenue passengers carried	150,587,185	131,350,416	14 6

*Deficit.

Suburban Line Suspends

The Providence & Danielson Railroad, Providence, R. I., on Oct. 3 discontinued service on its Providence-Danielson and its Chepatchet lines. The owners of the property have been experimenting with it since Sept. 7, when it was turned over to them in the hope of continuing operation. Negotiations have been opened with the representatives of the towns interested, looking toward their operating the line.

Financial News Notes

Branch Tram Line Sold.—The Montmorency branch of the Quebec Railway, Light, Heat & Power Company, Quebec, Que., is said to have been sold to an English syndicate for a price estimated at $2,500,000.

Municipal Lines Show Gain.—Receipts of the Toronto (Ont.) Civic Railway for the month of September were $46,558, an increase over the same month of 1919. During September, 1920, the municipal lines carried 2,775,708 passengers, as compared with 2,332,674 during September of last year.

Railway Sold at Auction.—The property of the South Morgantown (W. Va.) Traction Company was sold at auction on Oct. 2 to James H. McGrew, D. H. Courtney and Aaron J. Carlow, all of Morgantown. The price paid was $40,100. The property disposed of comprised 4 miles of track, two interurban cars, an amusement park of 16.5 acres and the buildings and fixtures, a carhouse and miscellaneous equipment. The railway has been operating for about a year under direction of A. J. Carlow, receiver, and in that period has paid all running expenses, taken up several obligations and has considerable cash to its credit. The new owners will continue to operate the line.

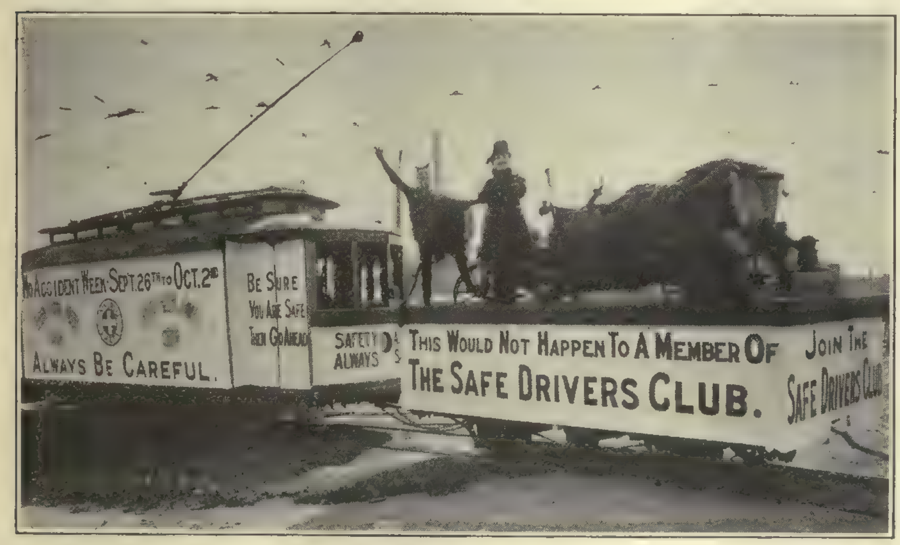
Bondholders Urged to Accept.—Bondholders of the St. Louis (Mo.) Railroad (Broadway Line) are urged in a second circular issued by Rolla Wells, receiver for the United Railways, St. Louis, to accept his offer to retire the $1,900,000 outstanding 4½ per cent bond issue of the St. Louis Railroad by turning over to the bondholders an equivalent par value of the three-year 7 per cent receiver's certificates. The date for the expiration of the bonds was May 1 of this year, but by agreement they were extended for six months. Under the provisions of this extension they would become due Nov. 1, but in his circular Mr. Wells says that a written demand for payment of principal was not served until June 14, 1920. In consequence an action for the foreclosure on account of default in payment of the principal could not be maintained until Dec. 1, 1920. According to the opinion of Charles W. Bates, attorney for the receiver 4½ per cent is the rate of interest that the bonds will legally bear from May 1, 1920, until they are paid. It is known that some of the bondholders have objected to the acceptance of the receiver's offer on the ground that they believe the bonds should bear interest at the rate of 6 per cent during the time of the six months' extension. Other phases of the company's finances are referred to on page 845.

Traffic and Transportation

Boosting for Safety

Railway Takes Active Part in "No Accident" Week in Milwaukee—Autoists More Careful

In connection with the Ninth Annual Congress of the National Safety Council, held in Milwaukee, Wis., from Sept. 26 to Oct. 2, there was conducted in the city a "No Accident Week" campaign. Among those organizations participating in the campaign was the Milwaukee Electric Railway & Light Company. The city cars of the company carried on the bumpers large posters reading as follows: "No Accident Week—Help Make Our City Safe From Accidents." The 1,700 trainmen of the company were furnished with celluloid buttons 2.5 in. in diameter with the same slogan inscribed upon them, the buttons being mounted on ribbon badges.


No Accident Week Sept. 26th to Oct. 2nd
Always Be Careful.
Be Sure You Are Safe Then Go Ahead
Safety Always
This Would Not Happen To A Member Of The Safe Drivers Club.
Join The Safe Drivers Club

SAFETY EXHIBIT OF MILWAUKEE COMPANY

During the week the company also operated a two-car train especially designed to teach a lesson of safety. The motor-car of the train bore upon its sides large banners with the standard safety motto in the center and such safety slogans as, "Don't Kid With Safety—You May Be The Goat." The trailer was a flat car with a built-up platform on which was placed a wrecked automobile, in the driver's seat of which was an employee of the Company dressed to represent the devil, while in the tonneau was another employee dressed to represent an undertaker. The trailer was equipped with a large bell and a fire siren which were operated to attract the attention of the public to the exhibit. It bore on its sides two banners, one reading: "This gentleman is not a member of the Safe Drivers' Club," while the other read: "This accident would not have happened to a member of the Safe Drivers' Club."

The Safe Drivers' Club is a local organization of automobile owners and chauffeurs who have pledged themselves to observe fundamental safety rules in the operation of their cars. This organization was founded and is being conducted under the auspices of the local Association of Commerce.

The company's safety exhibit was operated in residential districts during non-rush hours and in the downtown district during the rush hours. It attracted a great deal of attention and is believed to have taught a useful lesson. The exhibit was prepared under the direction of P. A. O'Keefe, chief safety inspector for the company.

The company has a permanent safety organization known as the Central Safety Committee. This was started about six years ago. It is composed of the heads of various departments and meets from time to time for the discussion and initiation of such safety measures in connection with the company's varied activities as may be needed. The chief safety inspector is its secretary. He is also the executive head of the safety enforcement committee, which was organized in January 1920, and whose duties are to enforce the safety rules promulgated from time to time for the benefit of the system's employees. It is on a military basis and the organization is such that there is always at least one safety representative of the safety enforcement committee present at the execution of any construction work that is being done by the Company. This representative is responsible for the observance of safety regulations.

Favors One-Man Cars

Tri-City Railway Proposes to Change Equipment as Means of Saving—Seeks Higher Rate

Installation of one-man cars on the Illinois lines of the Tri-City Railway & Light Company, Davenport, Iowa, was proposed at a hearing on Sept. 28 before the Illinois Public Utilities Commission. The hearing had been called by the commission to consider the company's petition for authority to charge a permanent fare of 10 cents in Illinois. Company officials declared that the use of "safeties" would help to solve the railway's financial difficulties.

It was estimated by officials of the company that such a system of operation would save the company $100,000 annually on its Illinois lines and $200,000 in Davenport over the same period. Cost of new safety car equipment makes the purchase of new cars out of the question, but cars in present use could be converted for one-man operation at an approximate cost of only $40,000. Two-man car operation in Illinois would be necessary during peak hours, it was stated. In Iowa this continuation of the present system would be unnecessary because of lighter traffic, it is estimated.

To test the accuracy of the estimate of savings under one-man operation, four cars will be put in service on the Prospect Park line in Moline if the Illinois commission recommends the experiment. It is understood that the city of Moline will welcome the test.

CARMEN FILE PROTEST

Illinois trainmen, representing the viewpoint of organized labor on one-man car operation, have filed a protest with the Illinois commission against this system of operation. The petitioners call it dangerous to the public and also state their belief that many men would lose their jobs if the new plan were put into force.

On July 20 an 8-cent fare was placed in effect in Moline and Rock Island as a temporary relief measure. Since that time the scale of trainmen's wages has been increased from 60 to 70 cents an hour. This increased labor cost has eaten up the additional income derived from the 8-cent rate. To such an extent have net revenues decreased that the company withdrew its application for a clause by which three tickets could be sold for 25 cents and made its plea for a straight 10-cent fare. In Davenport the fare is now 9 cents, three tickets for a quarter.

Seven Cents in Colorado Springs

The Colorado Springs & Interurban Railway, Colorado Springs, Col., has been authorized by the City Council of Colorado Springs to raise its fare to 7 cents cash. The company has been ordered to sell eight adults' tickets for 50 cents and eight children's tickets for 25 cents. Before taking effect new rates must be approved by the State Public Utilities Commission.

Eight per Cent Return Allowed

Georgia Commission Authorizes General Increase in Rates—Seven-Cent Cash Fare in Atlanta—Orders Service Improved

Holding that the Georgia Railway & Power Company, Atlanta, is entitled to a return of 8 per cent upon a total valuation of $41,000,000, the Georgia Railroad Commission on Sept. 22 authorized the company to charge a 7-cent cash fare on its railway lines in Atlanta. The company was directed to sell fifteen tokens or tickets for $1. The company has been charging a 6-cent fare since April, 1919. The commission also authorized an 8-cent cash fare with thirteen tickets for $1 on the company's lines in Gainesville. Free transfers were ordered continued. Charges for electric power and for gas were also substantially increased. The new rates took effect on Oct. 1. Fares on the lines in Decatur and College Park remain at 5 cents, since contracts between the company and the municipalities prevent any increases in these cities.

BY THE terms of the commission's order, the company is directed to place in service on its city and suburban routes, during the morning and afternoon rush hour periods as now established, additional seating capacity equal to 20 per cent of that now provided. This increased service is to be furnished at as early a date as practicable and, if the necessary equipment can be secured, within six months from Oct. 1, 1920. Commenting upon this stipulation, Walter T. Colquitt, counsel for the company, said:

WAGE SCALES, GEORGIA RAILWAY & POWER COMPANY

	Wage Scales in Effect July 1					
	1915		1918		1920	
Inspectors, per month		$95.00		$125.00		$172.50 to $185.00
Motormen, per hour..	1st 3 mos.	.17	1st yr.	.25	1st 3 mos.	.42
and..............	2nd 3 mos.	18	2nd yr.	.27	next 9 mos.	.44
Conductors, per hour	2nd 6 mos.	.19	3rd yr.	.29	thereafter	46
	2nd yr.	.21	4th yr.	30		
	3rd yr.	23	5th yr.	31		
	4th yr.	.24	6th yr.	.32		
	5th yr.	25				
Linemen, per hour..	$0 30 $0.31	$0.36½	$0.31 to	$0.40	$0 57 to	$0.63½
Common labor, per hour			.20	.21½	....	.35
Machinists, per hour..	39 to	.44	..	.50	83	.85
Carpenters, per hour...	27	32	.42	45	70	.80
Painters, per hour ..	18	39	25	48	63	.80
Car cleaners, per hour...			..	.20	...	.35

> Under a provision allowing only a 7-cent carfare and providing for large improvements of service, the Georgia Railway & Power Company would be far better off without the rate increase and without having to make the service increases. It would take a carfare of 20 cents for the company to make ends meet on an order requiring the company to make 20 per cent service increases and other improvements the commission considered. The company stands to lose close to $400,000 a year under such provisions.
>
> We recognize that some of the lines ought to be improved and they will be improved, but there are other lines where decreases in service are imperative.

$41,000,000 VALUATION

The company had applied for an 8-cent cash fare and for increases in power and gas rates amounting to approximately 33⅓ per cent. The commission, after an exhaustive inquiry, fixed the sum of $41,000,000 as a fair value of the combined properties owned, leased and devoted to the public use on April 30, 1920. Two years ago the commission estimated the fair value of the properties at $35,000,000 and the necessary working capital at $666,000, making a total of $35,666,000 upon which the company was at that time entitled to a reasonable return. Between Dec. 31, 1917, and April 30, 1920, the corporation's capital was augmented by the sum of $4,337,815. The working capital required to care for the properties under the new valuation is placed at $850,000. The commission found that for the year 1919, the company's net income amounted to approximately 6.2 per cent, and for the six months period ending June 30, 1920, to approximately 6.5 per cent on the $41,000,000 valuation. The smallest percentage of returns occurred in the railway department and in the outside electric department.

In support of its petition for increased revenue, the company submitted comprehensive data regarding increases in operating costs. The commission summarized the results of its study in the accompanying tables.

UNIT COSTS—GEORGIA RAILWAY & POWER COMPANY

Commodities and Materials f.o.b. Atlanta

	July 1st		
	1915	1918	1920
Coal, per ton.....	$2.56	$5.01	$11.80
Copper, per lb....	0.23¼	0.27½	0.24¼
Steel wire, per lb	0 024	0.037	0 039
Standard poles, each, set.......	10.50	14.00	20.00
Cross arms and brackets........	0.58	0.94	1.67
Y. P. lumber, per 1,000 ft.........	16.00	34.00	55 00
Insulators.........	0.95	2.24	2.80
Creosoted ties, each...........	0.69	1.07	2 02
Cement, per bbl...	1.25	2.18	4.50
Steel rails, standard wt, per ton	31.43	74.00	70.00
Steel rails, girder, per ton.........	42.60	none bought	76.40
Spikes, per keg....	4.00	7.80	12.00
Ballast, crushed stone	1 00	1 80	3 13
Paving Brick .	22 00	none bought	42.00
1 Standard suburban car — complete..........	5,200.00	7,176.00	13,559.00
Standard PAYE Car — complete	4,201 00	5,819.00	11,937 00
1 Standard Trailer car — complete	2,120 00	2,995.00	6,063.00
1 Spl work 2 piece crossing........	1,496.00	2,540.00	2,540.00

Regarding the matter of return, the commission's order said:

> A public utility with rates providing only a 5 or 6 per cent return cannot secure new capital in competition with a private business earning an 8 or 10 per cent return. It should be further borne in mind that the cause of the decreased purchasing power of the dollar, a return of 8 per cent now is not the equivalent of a 6 per cent return prior to the war. * * *
>
> This commission is of the opinion, after mature consideration, that a return on the fare value of the property and capital employed by applicant of 8 per cent is reasonable and really needed to enable it to render to the public, under existing conditions, efficient and adequate service, and the schedule of rates established in connection herewith is intended to provide approximately this return. Out of this percentage of net income applicants must meet its fixed charges, such as bond interest, sinking fund requirements, rentals, on leased properties, etc.

Jitneys Ruled Off Hartford Streets

The Board of Aldermen of Hartford, Conn., on Oct. 11 adopted an ordinance barring motor buses from the streets used by the Connecticut Company and from the congested business areas of the city. The measure will go into effect on Nov. 1 unless court action is brought by the jitney men to prevent its execution. It provides that belt-line jitney routes must be established in sections of the city not directly served by trolley lines.

The new ordinance was the work of a special committee consisting of Aldermen Robert C. Buell, Frank K. Daniels and James F. Noonan and Police Commissioners Morris Older and Wilbur Walker of the commission's traffic committee and Corporation Counsel Walter Schultz. It was passed under suspension of the rules, by a vote of 15 to 8. The ordinance provides that:

> No person, firm or corporation shall operate a public service motor vehicle popularly termed a jitney, as such, along any other streets or parts of streets than those established and fixed in this ordinance as traffic routes. Any person, firm or corporation violating any of the provisions of this ordinance shall upon conviction be fined $50 for each offense. This ordinance shall take effect Nov. 1, 1920.

"Mass Honesty" Test Successful

Square-dealing is a characteristic of the citizens of Pittsburgh, Pa. That is the opinion of Charles A. Fagan, W. D. George and S. L. Tone, receivers of the Pittsburgh Railways. They base their contention that Pittsburghers are fundamentally honest upon an experiment which they conducted in connection with the recent increase in token fare from 7½ cents to 8⅓ cents.

To save unnecessary expense the receivers decided to make no change in the form of token in use. They issued a statement to the public explaining their position and pointing out that, while tokens purchased prior to the increase in price would be accepted when the new rate took effect, car riders could aid the railway by refraining from "stocking up" on the metal discs prior to the advance. Receiver Fagan commented upon the results of this experiment as follows:

> A great deal of fun has been poked at the receivers for taking the public into their confidence, under the impression that the public would take advantage of the situation to load up with the metal discs. This possibility was taken into account in the calculations made by the receivers of the extent to which the sales would in-

crease, and we are gratified to say that the sales did not reach our expectations. We felt that in deference to the consideration the public has shown in this unavoidable increase in street car fares, the public was entitled to know in advance that the type of metal token tickets in use were not to be changed. In obviating the confusion of a change in the kind of tickets in use, the irritation of refunds involving a few cents, and ill temper and delays, the experiment was a complete success. We would do it all over.

The returns from the sales of tokens in the two days preceding the increase were upwards of 1,000,000 tokens in excess of the normal number for two days. The so-called bargain-counter rush would not have required us to limit the sales of tokens, as originally intended, if the type of ticket in use had been of the paper kind, as such tickets are used only once and then destroyed. The supply of metal tokens, however, is limited and inasmuch as they are used repeatedly, there necessarily must be some tokens each day in the hands of the conductors for handling the next day's business and also some in the fare boxes.

Approximately 20 per cent of the car riders took advantage of the opportunity to get more than their usual supply of tickets, and thereby caused parts of the system to be without tokens to sell to those who required them and thus created a necessity for limiting the number of tokens to be sold to one person to two at one time.

Transportation News Notes

Eight Cents in Berlin.—The New Hampshire Public Service Commission has authorized the Berlin Street Railway to raise its cash fare from 5 cents to 8 cents. Five tickets will be sold for 35 cents.

Upholds Eight-Cent Fare.—The Pennsylvania Public Service Commission has dismissed complaints of the city of Wilkes-Barre and various boroughs, townships and individuals of Luzerne County against the 8-cent fare charged by the Wilkes-Barre Railway. The commission authorized the company to raise its fare to 8 cents cash two years ago. Four tickets are sold for 30 cents.

Rejects Seven-Cent Fare.—The City Council of Clinton, Iowa, has refused a petition presented by the Clinton Street Railway for authority to raise its fare to 7 cents. The company sought the elimination of workingmen's tickets, which have been sold at the rate of forty for $1. Representatives of local labor unions opposed a higher fare.

Will Vote on Fare Increase.—The voters of Kalamazoo, Mich., will decide at the general election on Nov. 2 the question of granting the Michigan Railway an increase in fare from 7 cents to 10 cents. At a former referendum the rate advance was refused. The City Commission has authorized the company to put the 10-cent fare in effect temporarily.

Municipal Line Raises Fare.—The board of directors of the municipally-owned Norton, Taunton & Attleboro Street Railway, Norton, Mass., has voted to discontinue the sale of sixteen tickets for $1 and to charge a straight 10-cent fare in each zone. The railway's employees are asking for an increase in wages to a maximum of 75 cents an hour.

Tokens in Buffalo.—The International Railway, Buffalo, N. Y., has begun the use of metal tokens. These replace the paper tickets which have been in use since the 7-cent fare went into effect. The tokens are slightly smaller in size than a dime and are sold at the rate of four for 25 cents, the same as the tickets. The company's fare boxes have been rearranged so that the tokens register on a separate dial from the cash fares.

Bus Permit Revoked.—The City Commission of Newark, N. J. has directed City Counsel Congleton to prepare an ordinance rescinding the franchise of the General Omnibus Company. The company was given permission in January, 1919, to operate a number of buses in Newark. Under the terms of the agreement it was to begin service before July 1 last. Failure to comply with this condition led to a demand that the franchise be revoked.

Ten Cents in Waterloo.—A 10-cent cash fare took effect on the lines of the Waterloo, Cedar Falls & Northern Railway, Waterloo, Iowa, on Sept. 15. The fare was formerly 5 cents. The advance was authorized by the board of arbitration which recently awarded the company's employees an increase in wages. Thirteen workmen's tickets or twenty children's tickets are sold for $1, good during designated hours. A similar schedule of rates is in effect on the company's lines in Cedar Falls.

Eight Cents Asked in Johnstown.—The Johnstown (Pa.) Traction Company has petitioned the State Public Service Commission for authority to charge an 8-cent cash fare and to sell four tickets for 30 cents on its Johnstown city lines. The present fare is 7 cents cash with four tickets for 25 cents. The company on Oct. 1 raised the wages of its carmen from 50, 52.5 and 55 cents an hour to 55, 57.5 and 60 cents an hour.

Front-Exit Cars in Twin Cities.—Front-exit cars will soon be operating through the streets of Minneapolis and St. Paul, Minn. Three hundred cars of the old type are being remodeled by the Twin City Rapid Transit Company. Of the reconstructed cars, 175 will be placed in service on the Minneapolis lines and 125 on the St. Paul lines. The equipping of the cars has been delayed by the difficulty of obtaining castings. These are now being received at the company's Snelling shops.

Four Cents a Mile Allowed.—The Southwestern Traction Company, Temple, Texas, which operates an interurban line from Temple to Belton, Texas, a distance of twelve miles, has been granted authority by the Texas Railroad Commission to increase its passenger fares between the two towns from 35 cents to 49 cents, and to make proportionate increases for intermediate stations. The company contended that 35 cents was confiscatory.

Rate Dispute Settled.—The Kentucky Railroad Commission on Oct. 7 entered an order approving the new schedule of interurban rates of the Louisville & Interurban Railroad, Louisville. The commission also rescinded the order requiring the Attorney General and Commonwealth's attorneys in the counties affected to bring an action against the company. Under the new schedule cash passenger fares will be collected on all trips beyond the city limits on a 3-cents-a-mile basis.

More Trains on Subway.—Under an order issued on Sept. 29 by the Public Service Commission for the First District the Interborough Rapid Transit Company, New York, N. Y., has resumed the operation of trains on practically rush hour schedules during nearly the entire day. The order for the improved service was issued last April but was suspended during the past few months. It provides for the maximum of service in all hours except the middle of the day and late at night.

Wants More in New Castle.—The Pennsylvania-Ohio Electric Company, Youngstown, Ohio, has filed with the Pennsylvania Public Service Commission a new schedule of rates, under which it proposes to raise its fare on its lines in New Castle, Pa., from 7 cents to 10 cents. The company contends that the 7-cent fare is insufficient to meet operating expenses and to pay a fair return on the investment. The city authorities have announced that they will oppose any increase in fare.

Busmen May Unite.—An attempt is being made to form one central organization embracing all the large and small jitney buses in Hartford, Conn. The Hartford Public Service Operatives' Protective Association is back of this movement. An association to be known as the Hartford Bus Corporation is being formed. The capitalization will be $50,000. The officers of the corporation are: Harry A. Cohen, president; D. S. Wells, secretary; C. J. Miller, financial secretary, and Joseph M. Namourn, treasurer.

One-Man Cars in Houston.—The Houston (Tex.) Electric Company has received its first consignment of twelve one-man safety cars. Additional cars have been ordered and will be put into service in Houston as rapidly as they are received. The company is still operating at a 7-cent fare under the court decree holding the 5-cent rate to be confiscatory and declaring that the company is entitled to earn 8 per cent on its investment after 4½ per cent has been charged off for depreciation. Efforts so far to negotiate a new franchise have so far failed.

"Safeties" Approved, Fare Reduced.—A 1-cent reduction has been made in the fare charged by the Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa, as the result of the introduction of one-man safety cars. The company recently raised its fare from 6 cents to

8 cents. It subsequently applied to the City Council for permission to use "safeties." The Council consented, the company agreeing to reduce the fare. The carmen objected to this scheme and went out on strike on Sept. 24. They returned to work on Sept. 27. On that date the one-man cars and the 7-cent fare were placed in operation.

May Abandon San Diego Lines.—Service may have to be abandoned on a numer of lines of the San Diego (Cal.) Electric Railway in the near future, according to a statement made by William Clayton, vice-president and managing director of the company, at a recent hearing before the San Diego City Council. Mr. Clayton declared that the railway was willing to make track improvements in so far as it was financially able, but that it was unable to undertake the street paving as requested by the council. It is proposed to abandon the Market Street line between Fifth and Sixteenth and the Spruce Street line because of insufficient patronage.

City May Run Lines.—Operation of the Lowell Division of the Eastern Massachusetts Street Railway by the city of Lowell, Mass., was suggested by Homer Loring, chairman of the public trustees of the company, at a recent conference with municipal officials and the members of the local Chamber of Commerce. Mr. Loring proposed that the city undertake to operate the Lowell lines for a period of three months. The city, in addition to meeting operating expenses, would be required to pay interest at the rate of 6 per cent annually on the value of the railway property. The proposition may be submitted to the voters at the general election on Nov. 2.

Increase Asked in Sacramento.—Asking that the State Railroad Commission investigate the cost of operation of its lines in Sacramento, the Pacific Gas & Electric Company has filed a petition with the commission looking toward an increased fare. The application asks that the commission make an order establishing such rates as will provide a reasonable return upon the property investment. The company gives the value of its railway holdings in Sacramento, exclusive of franchise or going concern value, as $2,449,285. For the fiscal year ended June 30, 1920, it is stated the gross revenue totaled $727,647, and the operating expenses $586,073, leaving a total of $131,574 available for depreciation and returns. The fare is now 5 cents.

Motor Buses as Election Issue.—Establishment by the city of Winnipeg, Man., of municipal motor bus lines is demanded by the Winnipeg labor party, which is making the question an election issue. The labor unions are supporting the candidacy of Councilmen pledged to work for the installation of a motor bus system to be owned by the city and to give service at a fare below that charged by the Winnipeg Electric Railway. They also demand that the railway be compelled to abide by the provisions of its original agreement with the city, limiting the fare to 5 cents, or that it surrender its franchise. A 7-cent cash fare took effect in Winnipeg on Sept. 1, the rate having been 6 cents for the past year. The increase in fare was strongly opposed at the time by the labor element.

Five Cents a Mile Asked.—The Southern New York Power & Railway Corporation, Cooperstown, N. Y., has asked the Public Service Commission, Second District, for permission to increase its interurban passenger rate from 4 to 5 cents a mile and to discontinue the sale of mileage books. The company's petition states that its line is paralleled by improved state highways and that there is competition from auto buses and freight truck lines, and that grades render operation of cars expensive. The company alleges, in support of its application, increases in the costs of materials and labor, stating that subsequent to June 1 there had been wage increases approximating 23 per cent in the operating department and 12 per cent in other departments. Arbitration of the strike in July, in states, added $25,000 to the payroll.

Seven Cents in Pine Bluff.—The Pine Bluff Company, operating the electric railway system in Pine Bluff, Ark., raised its fares from 6 cents to 7 cents on Sept. 21. The increase had been approved by the City Council and the State Corporation Commission. Fifty tickets are sold for $3 at the railway's offices. The company voluntarily reduced the rate for school children by putting on sale fifty tickets for $2.50 good at any hour between 8 a.m. and 5 p.m. There has been no material reduction in the number of passengers since the new rates took effect. In preparation for the increase the management carried on a campaign of education by means of a series of advertisements in the Pine Bluff newspapers. A. G. Whidden, advertising manager of the company, was in charge of this publicity work.

Jersey Busmen Answer Railway.—Thirty-one owners of jitney buses operating in Newark, Paterson, Jersey City and other cities of New Jersey, have filed their answer in the Court of Chancery to a complaint made by the Public Service Railway, Newark, alleging the competition of the buses to be illegal. Several months ago the railway started legal proceedings to have the jitneys ousted from the streets in which it has tracks. In their answer, the busmen disclaim all responsibility for the company's failure to earn a profitable revenue, and throw the blame for such failure upon the corporation. They contend that for the court to restrain the operation of the defendents' buses would not only deprive the defendents of their right to make a livelihood, but would also deprive the public of means of transportation to which it is entitled.

Street Collection Speeds Up Service.—The Chicago (Ill.) Surface Lines has begun the use of front-end street collections at various congested points as a means of speeding up the loading of cars, filling up the front end, and in general improving schedules. Points of heavy transfer where a line stub-ends, such as at Adams and State Streets, Van Buren and State Streets, and Twelfth Street and Wabash Avenue, were the first locations at which auxiliary collectors were provided. The plan will be extended to other heavy transfer points and to industrial plants such as the Western Electric Company, and Sears, Roebuck & Company, where large numbers of employees must be handled in the rush hours. Adoption of this plan was recommended by John A. Beeler, consulting engineer, New York, who is making an extensive study of conditions in Chicago. The collectors are equipped with the usual small portable register, transfers, etc.

Intrastate Rate Powers Argued.—Conflicting opinions as to the authority of the Interstate Commerce Commission to prescribe intrastate rates were presented to the commission on Oct. 12 by representatives of the railroads and state commissions at the hearings on application of the roads of New York and Illinois for an order increasing intrastate passenger fares to the level of the 20 per cent advance granted for interstate traffic. Spokesmen for the railroads contended that the transportation act made the whole rate structure of the country a matter for the consideration of the Interstate Commerce Commission, and that the Federal authority no longer was confined solely to the regulation of interstate traffic. State commissioners, however, argued that the commission was without authority to make blanket increases in the traffic charges within the boundaries of a state and that Congress in passing the new law did not broaden the power of the commission over intrastate regulation.

May Raise Reading Fares.—Reading Transit & Light Company, Reading, Pa., has filed with the Pennsylvania Public Service Commission a new schedule of fares for its entire system, comprising the lines of Reading, Norristown and Lebanon and the suburbs, to go into effect on Oct. 27. The new schedule provides for an increase from 7 cents to 8 cents on thirty lines in Reading and Lebanon, and an advance from 8 cents to 9 cents in Norristown and on all suburban lines of the system. Under the new schedules monthly commutation books and excursion tickets will be discontinued, but there will be no curtailment of the practically universal transfer privileges or other features of the service. Constantly increasing cost of operating the system is given by the company as the reason of the advance. Experts engaged by the city to make a survey of the property of the company have placed the total valuation of the lines between Norristown and Lebanon at approximately $4,600,000. The company's experts are said to have placed the value of its property at $6,500,000.

Personal Mention

General Manager Named for Toronto Commission

H. H. Couzens, general manager of the Civic Hydro-Electric Commission, of Toronto, Ont., was on Sept. 28 appointed general manager of the Toronto Transportation Commission, which is to take over and manage the system of the Toronto Railway at the expiration of the latter's franchise in September, 1921.

The commission also appointed R. C. Harris, Commissioner of Works for the city; E. L. Cousins, general manager of the Harbor Commission, and F. A. Gaby, chief engineer of the Hydro-Electric Power Commission, as a committee to serve in a consulting capacity with a view to co-ordinating the interests represented by them and obtaining the benefit of their advice on the problems arising in connection with the taking over of the railway lines.

One of these problems involves the altering of the gage of the Toronto Railway and the Toronto Civic Railway lines now operating in St. Clair, Danforth and Gerrard Avenues, which were constructed in 1912 and 1914. The gage on both the privately owned and the civic lines is 4 ft. 11 in., in comparison with the standard of 4 ft. 8½ in. The importance of this question will be understood when considered in connection with the Ontario hydro-radial project. If the gage is not changed to conform to the standard gage, the Toronto system will be unable to take advantage of the night haul of radial express and freight cars into the city, and much revenue will be lost.

E. C. Brister has resigned as general manager of the Alexandria (La.) Municipal Street Railway. Mr. Brister has accepted a position as manager of the Alexandria municipal power station.

Dean McLaughlin, superintendent of the Michigan Railroad, Kalamazoo, Mich., has resigned to join the organization of the Ohio Brass Company, Mansfield, Ohio. Mr. McLaughlin has been connected with the Michigan Railroad and with its predecessor, the Michigan United Traction Company, for the past eight years. Prior to that time he served with the Toledo Railways & Light Company, Toledo, Ohio.

Robert J. Dunham has resigned as vice-president of Armour & Company, Chicago, Ill., and will sever all connection with the Armour interests. Mr. Dunham was receiver of the Kansas City (Mo.) Railways on the occasion of its former receivership, ended in 1914. Subsequently he served as chairman of the board of the Kansas City Railways until his resignation in June of this year. He is now president of the Sioux City Service Company, Sioux City, Iowa, a property controlled by the Armours, but will resign this position in the near future.

Steam Operator Chosen

Ernest Stenger, New President of the Denver Tramway, Long with Union Pacific System

Steam railroading has lost an able executive to the electric railway field in the person of Ernest Stenger, the newly elected president of the Denver (Col.) Tramway. Mr. Stenger has already achieved a reputation for "getting things done" as superintendent of the Southern Division of the Union Pacific Railroad. The experience which he has thus gained will stand him in good stead in taking up for the first time the management of a traction property.

ERNEST STENGER

Mr. Stenger, as announced in last week's issue, has already entered upon his new duties. The office of president has been vacant since 1913, the direction of the affairs of the company having been largely in the hands of Charles Boettcher, chairman of the board of directors. In addition to serving as president, Mr. Stenger will perform the functions of general manager, Vice-President F. W. Hild having submitted his resignation to take effect as soon as the operating force has been reorganized. Mr. Stenger has announced that he will adhere to the present policies of the tramway, and that he contemplates no changes in the executive personnel.

Like most steam railroad executives, Mr. Stenger gained much of his experience in the school of hard knocks. A civil engineer by training, he has a broad understanding of the fundamentals of the transportation industry, which has not only made possible the rise to a position of responsibility with the Union Pacific, but which will enable him to visualize the problems of the Denver system. He is well acquainted with the West, his entire railroad career having been passed west of the Mississippi River.

Mr. Stenger was born in 1865 at Colmar, Alsace. Coming at an early age to the United States he was graduated from the University of Michigan in 1886. In the same year he entered the railway service as a rodman with the Burlington & Missouri River Railroad in Nebraska. After two years of this work he was appointed a draftsman with the Atchison, Topeka & Sante Fè Railway, resigning in 1890 to become assistant engineer with the Missouri Pacific Railway.

After serving with the Missouri Pacific for ten years, Mr. Stenger resigned to join the Union Pacific System. His first position with that road was that of division engineer. He later served as assistant superintendent and as division superintendent. In 1907 he was made general superintendent of the Rio Grande Western Railway, continuing in that capacity until March, 1911. He then became general manager of the St. Joseph & Grand Island Railway, with headquarters at St. Joseph, Mo. He subsequently returned to the Union Pacific as superintendent of the Southern Division, making his headquarters at Kansas City.

During the war Mr. Stenger served with the American Expeditionary Forces in France as lieutenant-colonel of the 31st Engineers, directing the transportation of supplies to the battle front.

W. W. Nielsen, assistant secretary of the Springfield (Mo.) Traction Company, has resigned. Mr. Nielsen has accepted a position with the International Coal & Products Company, a Virginia corporation. He has been connected with the Springfield Traction Company since May, 1919.

Robert W. Hewins, who recently submitted his resignation as superintendent of the Norton, Taunton & Attleboro Street Railway, Norton, Mass., has reconsidered his action at the request of the board of directors and has announced that he will continue with the road indefinitely.

Frederick W. Heffernan has been appointed superintendent of transportation of the Augusta Division of the Androscoggin & Kennebec Railway, Lewiston, Maine. Mr. Heffernan succeeds George W. Bowie, resigned. He has been connected with the company for a number of years.

Louis A. Pease, division superintendent of the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., with headquarters at Erie, Pa., has resigned. Mr. Pease was appointed superintendent of the western division of the railway four years ago. He was formerly a conductor with the same system.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES　　BUSINESS ANNOUNCEMENTS

Large Turbo-Generators in Strong Demand

Westinghouse Orders Amount to More Than 500,000 Hp. in the Last Three Months

The Westinghouse Electric & Manufacturing Company announces that it has received within the past three months orders from electric light and power companies for more than 500,000 hp. of turbo-generators. Among these are:

Cheswick Power Company, Pittsburgh, Pa., one compound unit of 60,000 kw., which will be one of the largest engines ever built.

Narragansett Electric Lighting Company, Providence, R. I., one compound unit of 45,000 kw.

United Electric Light & Power Company, New York, two compound units of 35,000 kw. each.

Brooklyn (N. Y.) Edison Company, two single units of 25,000 kw. each.

United Electric Company, Springfield, Mass., a single unit of 25,000 kw.

Commonwealth Edison Company, Chicago, one compound unit of 35,000 kw.

Havana (Cuba) Electric Railway Company, two single units of 25,000 kw. each.

Commenting on the sale of these large steam turbines, E. H. Sniffin, manager of the power department, Westinghouse Electric & Manufacturing Company, pointed out that the business in large turbine units was about equally divided, as to number, between units of over 30,000 kw. and units of under 30,000 kw. rating. Owing to the reliability of the multi-cylinder type, he stated, it is believed that it eliminates many problems of design which would occur, owing to the physical dimensions, with the single cylinder in these very large sizes. From the present knowledge of design it appears, according to Mr. Sniffin, that this will continue to be the case for some time to come, but, of course, definite prediction cannot be made on account of the rapid development in the industry.

British Purchase American Rails

The question of ordering American rails again came before the Town Council of Glasgow on Sept. 1. It may be recalled that a recommendation by the tramways committee to give an order to the United States Steel Products Company for 10,000 tons of steel rails and fishplates had been referred back to the committee. The latter reconsidered the subject and renewed its recommendation, which was again brought forward. In the interval, owing to the necessity of getting rails as soon as possible, the general manager, with the concurrence of the chairman of the tramways committee, accepted the contract and gave the order. The labor members of the council again made the allegation that the steel workers in America had to work excessive hours and that in this way the American prices for rails were lower than the British. This was met by the statement that the president of the American rail manufacturing company gave a personal guarantee that the rails were being produced under fair conditions. The proposal of the committee was carried by forty-two votes against eighteen. The American price is £23, 10s. per ton, while the only British tender received was £28 per ton.

Special Coal Permits for Emergency Needs

General Privilege of Assigned Cars to Utilities Rescinded—Committee of Three Hears Cases

While service order 21, issued October 8 by the Interstate Commerce Commission, takes away the privilege of assigned cars to public utilities generally, the new order makes the securing of emergency coal more certain. It provides a sort of super-rating for cars needed to supply utilities in distress. Because the old order had been abused to an important extent the commission decided that the need for emergency coal would have to be established in each individual case. It therefore has appointed a committee which is to pass on all applications for emergency coal. The committee is constituted as follows: W. L. Barnes, American Railroad Association; D. B. Wentz, president of the National Coal Association, and G. W. Elliott of the National Committee on Gas and Electric Service.

With the operators and the railroads represented on this committee it is believed that most applications can be taken care of without resort to the commission's order. The operators see that utilities are kept in coal.

All applications by utilities for relief in the matter of coal supply should be addressed to the National Committee on Gas and Electric Service, Munsey Building, Washington, D. C. As a result of the better understanding which has followed the conferences which preceded the issuance of the new orders it is believed that the crisis in the coal situation has passed. With the issuance of Order 21 the commission also curtailed all outstanding permits for the use of open-top equipment for other than coal-carrying purposes.

Railway Motor Manufacturers Optimistic

Demand Light at Present, but Manufacturing Conditions Are Improved, with Heavier Sales Expected

Demand for railway motors at present is light, according to leading manufacturers. Electric traction companies are said to be buying new rolling stock only when absolutely necessary. The trend of demand has been more and more toward safety cars, so that now the number of motors bought for heavy car service is small compared with the safety car types. One result of this tendency has been an improvement in delivery conditions, since in the safety car motor certain material such as gears can be more or less standardized. One of the largest motor manufacturers in the country is optimistic regarding future business on the ground that the attitude of the public toward electric railways is improving in respect to higher fares and increased transportation facilities. Virtually all of the lines are badly in need of additional equipment, this company states. Heretofore, more cars at old rates of fare in many cases meant greater loss in operation, however, and the money with which to make extensions has been lacking. Demand, as a result, has not been as great as it would have been if the railway companies could finance new equipment. This condition is said to be gradually improving.

Manufacturing conditions are fairly favorable at present. Raw material is causing little trouble. The shortage of gears and of insulating material that prevailed during the summer has been relieved. Furthermore, producers are anticipating their needs well in advance, keeping a good running stock of material on hand at the factory. A reserve supply of motors is also maintained with each of the car builders, it is stated. Reasonable shipments can be made. One manufacturer quotes deliveries of from forty-five to sixty days. No cancellations have been reported.

Small hope of any immediate reduction in prices is held out by one of the leading interests, until there is a reduction in wages paid the men who build the equipments. This view holds that the high level attained by railway motor prices since prior to the war has been very largely caused by the tremendous demands of labor all along the line, from the ore in the ground to the finished product. Another producer, however, thinks that if any change comes about it will be in the direction of lower prices, provided the cost of raw material lessens.

Cement Market Greatly Undersupplied

Stocks Are Low and Deliveries Long In the Face of Heavy Demand—Prices Steady

Demand for cement holds up so strongly that manufacturers are still far from catching up with the volume of orders. In spite of the curtailment of the building industry in many sections of the country, the market for cement remains greatly undersupplied. Electric railways have not been heavy buyers, however, but according to one of the leading interests the outlook is bright for good business to develop from that quarter as well as from steam roads next year. According to an article recently appearing in the New York *Times*, there are orders hanging over the market for 15,000,000 barrels of cement at present that the industry cannot hope to catch up with for the next three or four months. The same source of information states that today there is no more than a national ten days' supply of this commodity in the country. The probable entire production for 1920 is placed at 95,000,000 barrels, provided the present approximate output of 70 per cent of capacity is maintained. Of this total, railroad needs are expected to account for 6.63 per cent of the supply.

Producers are so heavily booked ahead with orders that new business is not accepted for shipment earlier than about Dec. 1 in several representative cases. Mill stocks of cement are generally depleted. According to the *Times* report, there were about 5,000,000 barrels on hand on Oct. 1, compared with 10,000,000 barrels last year at that time. The raw material supply is reported favorable except in respect to coal.

Representative manufacturers express the view that the downward trend of prices in other lines will not affect the cement market. Some producers are covered by contracts for quite a while yet, and this circumstance, together with the present scarcity of the finished product and the prevailing high prices of coal and labor, is expected to operate against any immediate lowering of prices. Optimism is the keynote of the view which cement manufacturers take of the trade. In spite of excellent sales this year, 1921 should show even better results it is said. Many construction products which have long been postponed pending more favorable conditions, are expected to get under way, not only in the railway field, but in constructing highways, buildings, etc.

Street Car Plant Undamaged at St. Louis Car Fire

Fire which was discovered at midnight of Oct. 11 in the steel erection plant of the St. Louis Car Company at St. Louis, Mo., partially destroyed the plant and caused a loss which is estimated by fire department officials to exceed $500,000. The electric railway car assembly plant was not damaged, however. This was largely due to its being separated from the fire by a 100-ft. areaway. The phonograph assembling plant and the former aircraft building were also saved.

An explosion in an acetylene tank is said to have started the fire, which gained rapid headway because of the wind and the inflammable nature of the material stored at the plant. The buildings destroyed included the pneumatic tool, steel car, wheel and axle and truck departments, as well as the machine shop, power house, planing mill, pattern and storage warehouses and steel forgings plant. Most of these were new buildings. About 1,200 people are employed at the plant and it is expected that many of these will be thrown out of work. Besides street cars the company manufactures freight cars and passenger coaches, automobiles and cabinet phonographs.

At the date of going to press encouraging word has been received. Edwin B. Meissner, vice-president and general manager of the company, is quoted as saying that normal operation should be resumed by Nov. 10. The entire West Works and the main car-building section of the plant, as well as the lumber stock and dry kilns, remain intact, Mr. Meissner states. The destroyed wood mill and machine shop of the East Works can be taken care of by their counterpart in the West Works, it is stated.

Rolling Stock

The Northern Ohio Traction & Light Company, Akron, Ohio, noted in the Aug. 14 issue as having received authority to purchase twenty interurban cars in addition to the fifty-six city cars mentioned last week, has specified the following equipment on the interurban cars:

Number of cars ordered	20
Builder	The G. C. Kuhlman Car Company
Type	Interurban—Single End
Seating capacity	58
Weight, total	71,980 lb.
Bolster centers, length	32 ft. 6 in.
Length over all	55 ft. 11 in.
Truck wheelbase	0 ft. 84 in.
Width over all	8 ft. 6 in.
Height	12 ft. 9½ in.
Body	Steel
Interior trim	Mahogany
Headlining	Agasote—Buff
Roof	Arch
Air brakes	Westinghouse AMM
Axles	Penna. R.R. Standard
Bumpers	Hedley Anti-Climbers
Signal system	Westinghouse 8-T Signal System; Ohio Brass Company Marker Lamps and Signal System.
Control	G. E. MK
Couplers	Ohio Brass
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote
Designation signs	Hunter
Fenders or wheelguards	N. O. T. & L. Co. Std. Pilot
Hand brakes	American Brake Company
Heaters	Peter Smith Heater Company, Hot Water
Headlights	Crouse-Hinds LHH Luminous
Lightning arresters	G. E.
Motors	G.E.-240-B-4
Registers	Ohmer Fare Register Company
Sanders	Nichols-Lintern Company
Seats	Brill
Seating material	Fabrikoid
Trolley catchers or retrievers	Trolley Supply Company
Trolley wheels	More-Jones Brass & Metal Company
Trucks	Brill 27 MCB-2
Ventilators	Nichols-Lintern Company
Wheels	Forged Steel Wheel Company, 36 in.

Track and Roadway

Carolina Power & Light Company, Raleigh, N. C.—This company has been authorized by the Raleigh City Commission to double-track its line in Hillsboro Street from Park Road to Groveland Avenue.

Virginia Railway & Power Company, Richmond, Va.—The Church Street Improvement League will petition the City Manager and the Council against the removal of tracks from Church Street between Eighteenth and Twenty-sixth Streets, and to the re-routing of cars through Granby Street between these points, as turning business into Granby from Church Street. This property belongs to the Virginia Railway & Power Company operating in Norfolk.

Ohio Valley Electric Railway, Huntington, W. Va.—The city of Huntington, W. Va., has power by indirection to compel the Ohio Valley Electric Railway to double-track its Third Avenue line. That was the substance of a formal report on the problem filed with the commissioners on Aug. 2 by City Attorney O. J. Deegan. The matter was carried over until a later date in order that the commissioners might confer on the construction of the overhead crossing in front of the American Car & Foundry Company's plant. The two propositions are akin and the commissioners hope to handle both at the same time.

Monongahela Valley Traction Company, Fairmont, W. Va.—The probability of extending the lines of the Monongahela Valley Traction Company from Fairmont to Morgantown within the next twelve months is considered to be very strong by Morgantown business men in touch with the officials of the concern at Fairmont. The company right now has plans for such an extension under consideration and its start is predicted as soon as construction costs swing a little back toward normal. At the present time, the Monongahela Valley company operates cars as far north along the river as Riversville and has a graded right-of-way for some distance below Riversville toward Arnettsville. The distance between this terminal and Morgantown is about 12 miles. A survey which has been made for the proposed route is said to be most favorable for rapid construction, the grade being very light. It is known that several routes are being considered for the line.

Virginia Railway & Power Company, Richmond, Va.—The port terminals' committee of the Chamber of Commerce has framed a resolution calling on the Virginia Railway & Power Company to make an extension of its Pine Beach line to the Army Supply Base. This additional transportation service would materially aid about 1,500 employees of the U. S. Army who have to walk about one mile from the car line to the army base every day. This project before it can be considered must have the approval of the government.

St. Catharines, Ont.—The Welland Board of Trade will ask the Grand Trunk Railway to electrify the Welland division of the road from Port Dalhousie to Port Colbaine.

Hydro-Electric Power Commission of Ontario, Toronto, Ont.—The double-tracking of West London Street, Windsor, which will begin shortly, has been a long-promised improvement to the border street railway system. The delay has been caused by the difficulty in purchasing the equipment and the condition of the rolling stock taken over from the Detroit United some months ago.

Hydro-Electric Commission, Ontario, Canada.—H. G. Dickinson, superintendent of the Niagara Railway Arch Bridge Company, Niagara Falls, announces that Sir Adam Beck, chairman of the Ontario Hydro-Electric Commission of Canada, is seeking permission to run electric cars over the bridge to connect the Toronto and Rochester interurban lines. Charles E. Foster of New York, consulting engineer of the bridge company, has been called into conference regarding the plans. The proposed Toronto-Rochester interurban line has been under consideration for some time.

Trade Notes

General Railway Signal Company, Rochester, N. Y., has issued an addition to its direct current catalog volume I. The addition is dated September, 1920, and covers section J, Nos. 21-29.

F. M. Richards, formerly chief engineer of the Atlantic Shore Railway, Kennebunk, Me., has joined the forces of the Transit Equipment Company, New York City, in the capacity of chief engineer, it is announced.

The Greenfield Tap & Die Corporation, Greenfield, Mass., is offering $2,255,000 8 per cent cumulative preferred stock through bankers, which is part of a $5,000,000 authorized issue, the par value of which is $100.

Blaw-Knox Company, Pittsburgh, Pa., manufacturer of transmission towers, steel buildings, etc., on Oct. 1 opened a district office in Birmingham, Ala., in charge of Prescott V. Kelly. The company now has eight district offices.

Ohmer Fare Register Company, Dayton, Ohio, has just completed the addition of one story to its main building, making it a five-story structure. The change was necessary to take care of new types of machines and to increase present production.

Edward Casey has joined the Duff Manufacing Company as the sales representative of the forge department in the East, with offices at 50 Church Street, New York City, it is announced. Mr. Casey was formerly associated with Kraerter & Company and the Bethlehem Steel Company.

Sattley Company, Detroit, Mich., manufacturer of machines for sorting, counting, and wrapping coins, announces that it has moved into its new factory at 812 East Woodbridge Street. The new building comprises 16,000 sq.ft. of floor space and is expected greatly to increase the capacity of the company.

J. L. Galef, 75 Chambers Street, New York City, has taken over the exclusive sales agency of the McGill high-speed changer, manufactured by the McGill Metal Products Company, Chicago. The selling of the utility ticket punches will be continued by the manufacturer as heretofore.

Dwight P. Robinson & Company, Inc., New York City, with which Westinghouse, Church, Kerr & Company, Inc., is consolidated, devotes the current number of its publication, the *D. P. R. News*, to a railroad issue, emphasizing the importance of improving terminal facilities, roundhouses, shops, etc.

Sam W. Smith, formerly sales manager of the Uehling Instrument Company and at one time equipment engineer of the Southern New England Telephone Company, has joined the Smith Engineering & Supply Company, Boston, Mass., which represents the Uehling Instrument Company and the Adriance-Bate Company in New England.

M. A. Kretchmar, formerly chief lubricating engineer of the Sinclair Refining Company, has become associated with the Horrocks Desk Co., Herkimer, N. Y., it is announced, as supervising engineer and chief of sales. Mr. Kretchmar will devote his attention to promoting the Danight Wick Oiler for lubricating car axles, armature brasses, etc., which the company manufactures.

The Locomotive Superheater Company, New York, through its industrial department, has issued what is called a "Data Book for Engineers." This is a book with flexible covers containing sixty-four pages of data of every-day interest to the steam-plant engineer. Besides an abbreviated steam table, it contains a table of the various coals of the United States arranged by states and giving an approximate analysis.

The Habirshaw Electric Cable Company, 10 East Forty-third Street, New York City, has issued a combined statement of the earnings of the Habirshaw Electric Cable Company, Inc., the Electric Cable Company and the Bare Wire Company, for the five months ended May 31, 1920, as follows: Sales (not including Bare Wire Company), $4,846,807; profit in trading, $412,617, from which $163,767 was deducted for interest, discount and bonuses, leaving a net income of $248,850.

J. J. Edwards, secretary and treasurer of O. M. Edwards Company, Syracuse, N. Y., manufacturer of window fixtures, platform trap-doors, etc., announces that he has given up his duties at Syracuse and will devote his whole attention to the sales field throughout the entire country, with the object of getting into close touch with both steam and electric railways.

American Steam Conveyor Corporation, Chicago, Ill., announces a change in its corporate name to the "Conveyors Corporation of America." The company manufactures steam jet conveyors for handling ashes, etc., trolley conveyors, oil-bearing sheaves, and other conveyor supplies. A completely equipped machine shop, to which foundry facilities will be added, has been acquired at South Bend, Ind. No change either in personnel or business policy will be made, it is stated.

The United Railways Company of St. Louis and a number of street railway supply manufacturers will take part in a railway exposition which is to be given at the Railway Y. M. C. A., St. Louis, for one week starting Oct. 25. The exposition will be given under the auspices of the St. Louis Railway Club. The first and second floors of the Y. M. C. A. building and the grounds surrounding the building will be filled with steam and electric railway equipment, showing the progress that has been made in efficiency and labor-saving devices in the past ten years.

New Advertising Literature

Arc Welding.—The Ohio Brass Company, Mansfield, Ohio, has issued a booklet covering equipment and instructions for electric arc welding.

Automatic Arc Welder—The General Electric Company, Schenectady, N. Y., has issued booklet No. B-3575, covering automatic arc welders.

Used Material.—Transit Equipment Company, New York City, has issued bulletin No. 271, listing its second-hand railway motors, armatures, controllers, trucks, resistances and couplers.

Carbon Electrodes.—The National Carbon Company, 30 East Forty-second Street, New York, has distributed an instructive eighteen-page booklet on carbon electrodes for electric furnaces.

Water Screens.—The Link Belt Company, Chicago, Ill., has recently published a twenty-four page illustrated book covering its traveling water screens. Copies may be had on request.

Equipment.—Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has issued a fifteen-page special publication, No. 1636, covering its exhibit at the A. E. R. A. convention in Atlantic City.

Price Lists of Car Equipments.—The General Electric Company, Schenectady, N. Y., has issued bulletin No. 44,001-P, to supersede No. 44,001-O, of prices on renewal parts and supplies for car equipments, mine locomotives and railway and mine line material.

Electric Tools.—The Van Dorn Electric Tool Company, Cleveland, Ohio, is circulating a letter with typewritten pages attached, describing the growth and the products of the company. The company employs about 400 people and it has reached its fifteenth anniversary.

To Stop the Car or To Stop the Crowd?

What kind of a brake have you on your cars? A brake calculated for the weight of the car? —

or the weight of the car plus the crowd? (Often an equal weight, especially on Safeties).

Peacock Brakes

mean brakes by which braking power may be *increased* as the crowd jams on board and the steep grades are negotiated. Once tried out, your motormen *know this* — they operate the cars, then, with greater speed, for the greater confidence. This pays — pays well, too.

Peacocks can be delivered from stock.

NATIONAL BRAKE CO.
Buffalo, N.Y.

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Bankers and Engineers

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Incorporated

Design and Construct Steam Power Stations, Water Power Developments, Transmission Lines, Substations, Gas Plants.

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FARES AND BUSES
More revenue from more riders
143 Crary Ave., Mt. Vernon, N. Y.

Keep your Eye on the SEARCHLIGHT SECTION and your advertisements in it
612

WE BUILD TRACKS
Construction—Maintenance—Rehabilitation
ENGEL & HEVENOR
Track Engineers—Contractors
220 Broadway, New York City

ELECTRICAL TESTING LABORATORIES
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80th Street and East End Ave., New York, N. Y.

A. L. DRUM & COMPANY
CONSULTING AND CONSTRUCTING ENGINEERS
VALUATIONS AND FINANCIAL REPORTS
CONSTRUCTION AND MANAGEMENT OF ELECTRIC RAILWAYS
76 West Monroe St. CHICAGO, ILL.

Scofield Engineering Co.
POWER STATIONS
HYDRAULIC DEVELOPMENTS
Consulting Engineers
PHILADELPHIA, PA.
GAS WORKS
ELECTRIC RAILWAYS

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK
DETECTIVES
Street Railway Inspection
131 State St. BOSTON

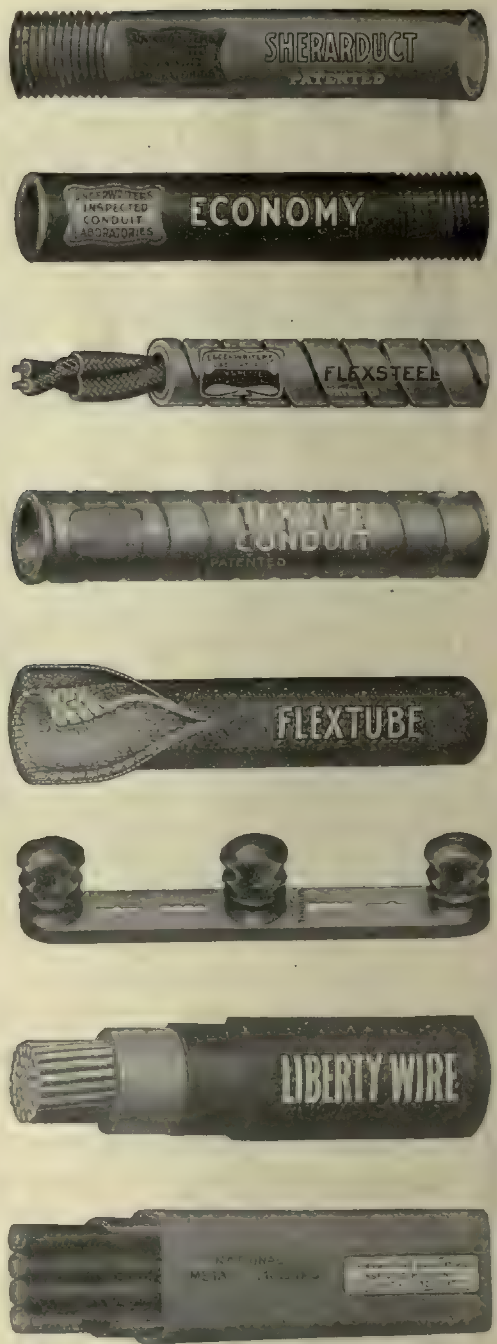
When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
Security Building, St. Louis, Mo.

"All You Require When You Wire"

The wiring of any type of Electric Railway Car or Power House can be properly handled with National Products. Every inch of National Conduit and every National Fitting, etc., surpasses specifications for durability, cleanliness and ease of "fishing"; and they possess specific advantages for the particular work for which intended.

A complete set of our convenient and helpful Correspondence Folder Catalogs will be sent upon request.



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General Offices: Pittsburgh, Pa.

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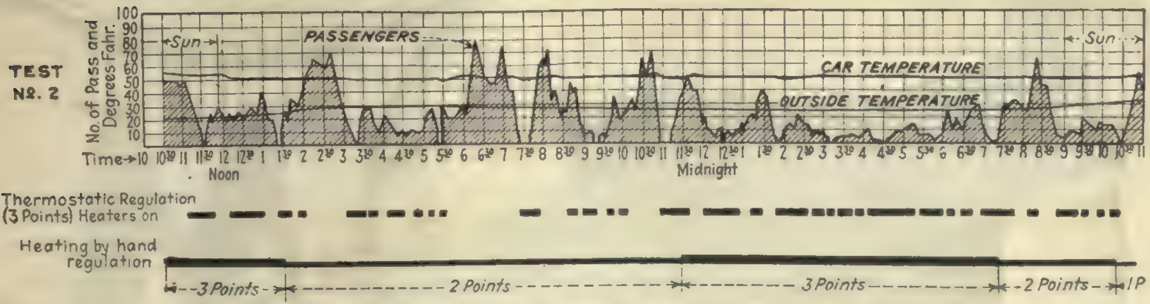
National Products are sold by Electrical Jobbers in every section of the country.

UTILITY

Saving 35%

A TEST on the Third Avenue Railway, New York, which was reported in Electric Railway Journal of June 19, 1920, showed a power saving of a little better than 35 per cent due to regulation of car heating by the Utility Thermometer Control.

The chart at the bottom of this page shows the outside temperature ranging from 22 to 32 degrees, the inside temperature constant at 50 degrees. Hand regulation, shown by the bottom line, is arranged for three intensities of heat, and was plotted more accurately than would be possible in actual service:. Actual consumption under Utility regulation was 87.84 kw. hours and the calculated consumption under proper hand regulation would have been 135.7 kw. hours, showing a saving of 35.26 per cent due to Utility Thermometer Control.



TEMPERATURE TEST NO. 2, USING THERMOSTATIC CONTROL

Railway Utility Co.

Chicago: 141-151 W. 22d St. **New York: 45 W. 34th St.**

VK

"TIGER BRONZE BEARINGS"

MJ

MORE-JONES

Perfect lubrication plus maximum conductivity. That's the combination that makes V-K Oilless Trolley Wheels lowest in ultimate cost and highest in net efficiency. Examine the construction of a V-K Wheel and you'll see why. Notice that it's properly balanced and mechanically perfect in finish. The metal from which it is made is especially tough, yet not too hard. This means greater mileage and at the same time least detriment to overhead construction. The patented oilless graphite and bronze gauze bushing is non-insulating, heat proof, long lived and easily interchangeable.

The V-K Trolley Wheel used with the V-K Non-Arcing Harp has proven it will do more to reduce trolley maintenance costs, both wheel replacements and overhead repairs, than any other current collector on the market today.

Write for Trolley Wheel Catalogue

The hundreds of Electric Railways that have standardized on More-Jones "Tiger" Bronze Axle and Armature Bearings have found they are by far most economical. The money they save in bearing replacements and in the rewinding of armature coils pays for "Tiger" Bronze Bearings many times over in the course of a year. And besides, there's the additional revenue derived by keeping the cars in constant service. The exceptional toughness and anti-frictional qualities of "Tiger" Bronze insures great strength and a very slow and even rate of wear. This, in turn, means correct bearing alignment and much greater mileage.

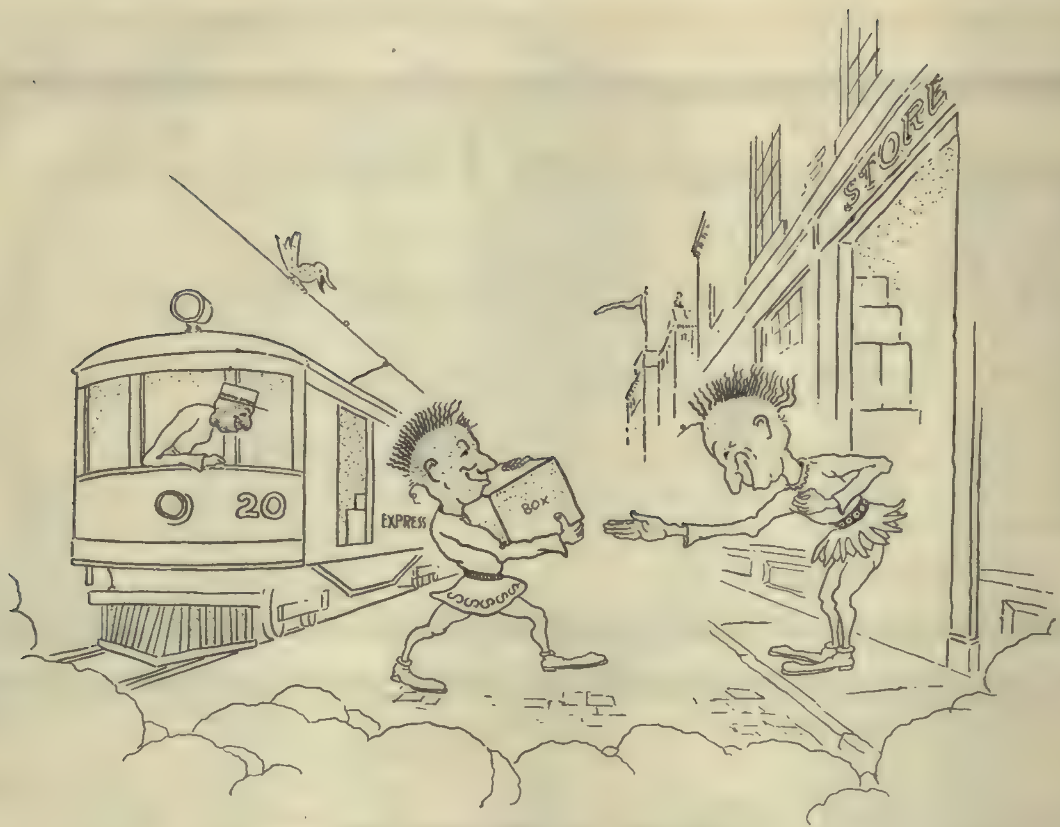
Write for Illustrated Bulletin

Here is a babbitt developed only after years of chemical and metallurgical research. Few metals have so emphatically demonstrated the difference between ordinary and specialized products as has M-J Armature Babbitt. The peculiar conditions of the electric railway armature bearing field as to temperature, strain, vibration, and pounding were but poorly met by ordinary babbitts. So More-Jones experts, with more than 40 years' experience to guide them, compounded an exceptional Babbitt of tin, copper, antimony and metallic nickel—*no lead*—especially for that service.

Service—not first cost is the basis upon which M-J Armature Babbitt is manufactured and sold.

Write for "The Babbitt Booklet"

BRASS & METAL CO., St. Louis, Mo.



CHAPTER TWENTY-THREE

THE ALL-*BUT* PERFECT STATE

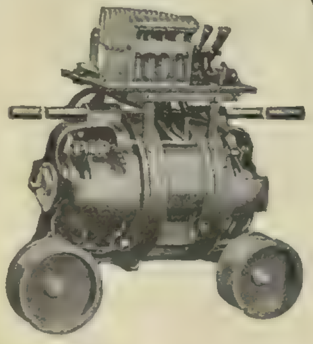
They Shall Ship Their Truck by Trolley

In every subdivision of the All-But Perfect State the local tradesmen will inaugurate "Ship by Trolley" movements.

They will want their goods shipped by trolley because they know that as the local railway prospers from such service—the better the service it can render to passengers—and the better the passenger service, the more passengers will ride—and the more passengers that ride, the more will come down into the shopping district.

Therefore inasmuch as shipping by trolley will benefit road, business men and passengers—why not do it now?

The increase in traffic will of course impose new burdens on the power house—but a Dynamotor put to work tuning up the return circuit will in most cases reclaim enough waste current to take care of the newly imposed profitable load.



READING NUMBER TWENTY-THREE

Q. You have claimed that you can buy the Dynamotor with the saving it effects. If as suggested above this saving is used for more power—what will buy the Dynamotor?

A. Put it to work in the shop, and it saves enough there to pay for itself. There's always a way.

Rail Welding and Bonding Company
Formerly The Lincoln Bonding Co.
RW&B
Cleveland, Ohio.

Shanklin Transfer Issuing Machine

A New Factor in Efficient Railroading

Particularly Valuable on One-Man and Pay-as-you-enter Cars

Quicker Schedules Possible.

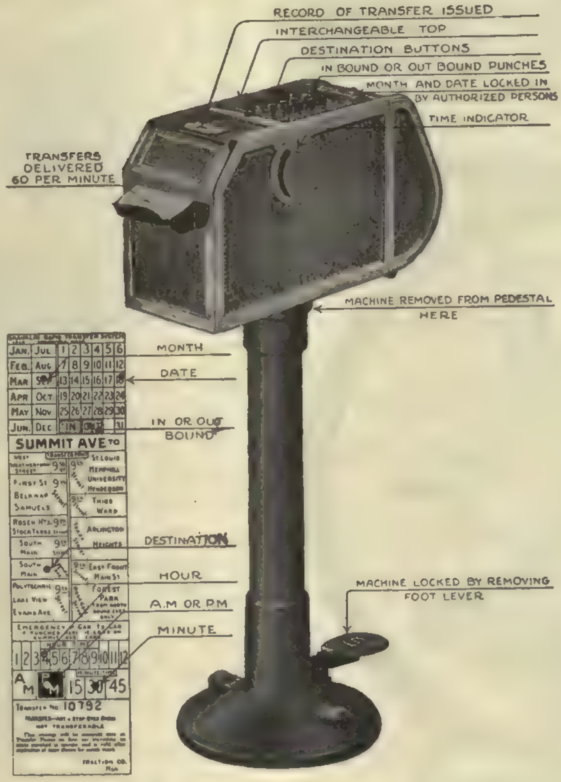
Platform operations speeded up.

Transfers issued 60 per minute if necessary.

Delays due to cost in loading passengers are reduced to a minimum. Lightens conductor's work, increases his efficiency.

Conductor or operator has both hands free for the operation of car or collection of fares.

Passenger secures transfer at the time of payment of fare without delay.


RECORD OF TRANSFER ISSUED
INTERCHANGEABLE TOP
DESTINATION BUTTONS
IN BOUND OR OUT BOUND PUNCHES
MONTH AND DATE LOCKED IN BY AUTHORIZED PERSONS
TIME INDICATOR
TRANSFERS DELIVERED 60 PER MINUTE
MACHINE REMOVED FROM PEDESTAL HERE
MONTH
DATE
IN OR OUT BOUND
DESTINATION
HOUR
A.M OR P.M
MINUTE
MACHINE LOCKED BY REMOVING FOOT LEVER
JAN. JUL FEB. AUG MAR SEP APR OCT MAY NOV JUN. DEC
IN OUT
SUMMIT AVE TO
Transfer No. 10792
TRACTION CO.

Each transfer issued is recorded.

Where transfers are paid for, there is a positive check on each one issued.

By the use of Transfer Machines, transfers are under the control of the auditing department.

Saving in paper is also effected with this system, as there is absolutely no waste of printed transfers; each transfer is used. The saving over the daily dated transfer now used is estimated to save over 40 per cent of printing.

Each transfer issued is punched with month, date, destination, minute and hour time, A.M. or P.M., also in or outbound.

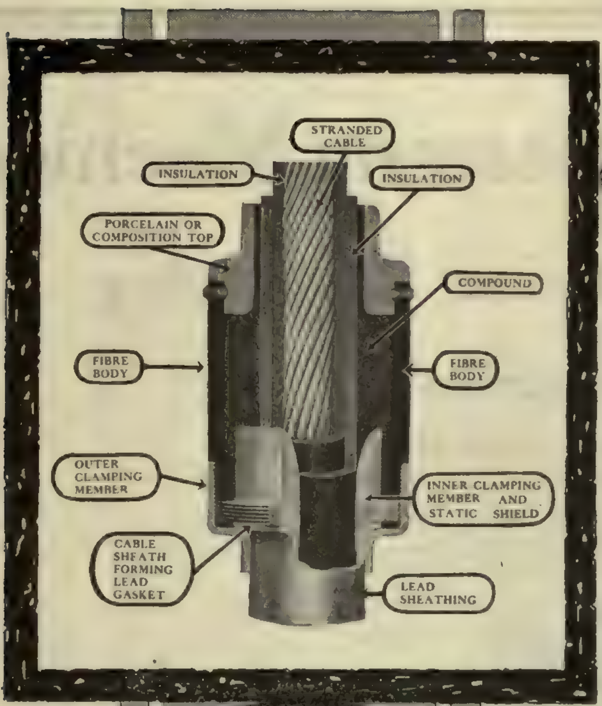
The claims made for the Transfer Machine are not exaggerated. They are simple statements of results secured during operating test.

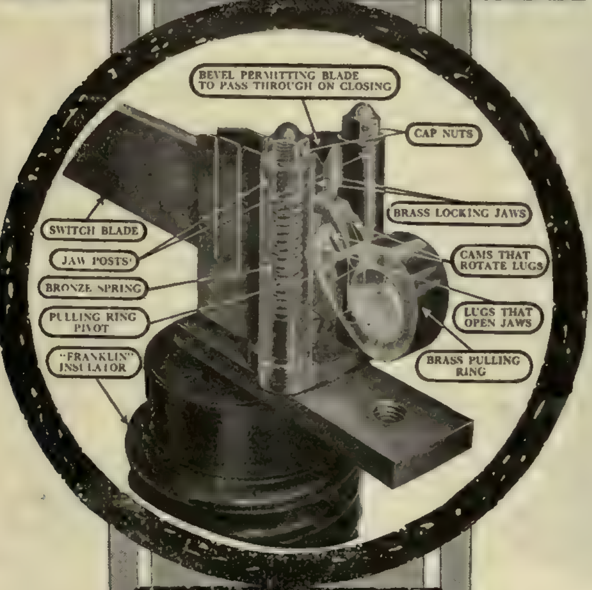
Submit your transfer on some particular line that you would prefer a trial.

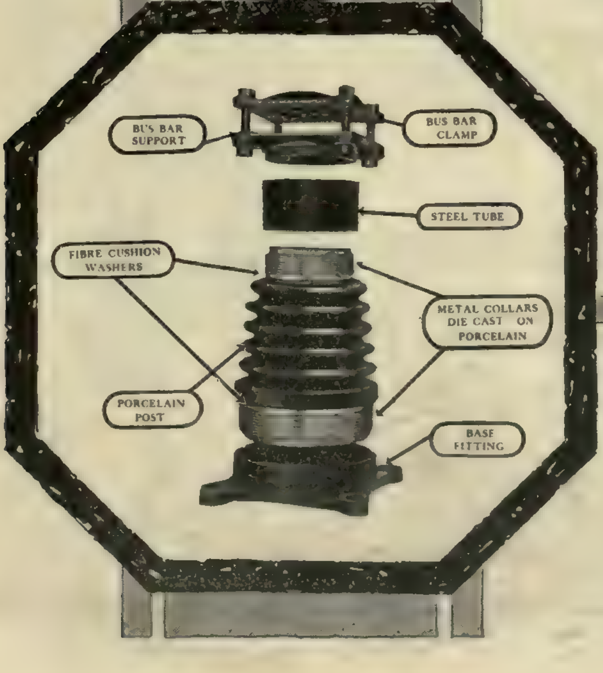
Shanklin Equipment Company, Inc.

Besse System Building
Springfield, Mass.

We regret our inability to exhibit our machines at the Convention this year, because of our force being rushed with installations and they could not be spared for the Convention.


STRANDED CABLE
INSULATION
INSULATION
PORCELAIN OR COMPOSITION TOP
COMPOUND
FIBRE BODY
FIBRE BODY
OUTER CLAMPING MEMBER
INNER CLAMPING MEMBER AND STATIC SHIELD
CABLE SHEATH FORMING LEAD GASKET
LEAD SHEATHING





Remember "FRANKLIN" by these things

EVERY device in the "FRANKLIN" line of generating station equipment is a safer thing to use. It has been designed for that definite purpose, and it *is* safer—for instance:

The "FRANKLIN" Post Type Insulator is safer because the metal bushings are die cast directly on to the porcelain, then machined and threaded to receive the fittings. There is no cement to crumble, no clamps to cause spot pressure, no dirt pockets. It gives great strength and durability. *It's safer.*

The "FRANKLIN" Pothead is safer because two clamping members automatically bell out the lead sheath of the cable and eliminate all possible concentration of static strain. It makes a waterproof, solderless joint. It is very strong and very simple to install. *It's safer.*

The "FRANKLIN" Disconnecting Switch is safer because it combines the safer qualities of the "FRANKLIN" Insulator with the "FRANKLIN" Positive Lock. This lock makes a closed bridge across the blade at such an angle that resultant electric forces tend to hold it more tightly closed. Yet one pull of the hook-stick opens both lock and blade. It is very strong and sure. *It's safer.*

These are just three features of the "FRANKLIN" line. Test them. Try them. Study them. Use them. See why it is we say—*"Install the 'FRANKLIN' and forget it."* Every "FRANKLIN" device has distinct refinements that make it better, surer and safer.

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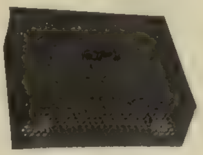
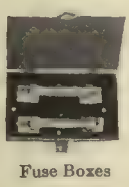
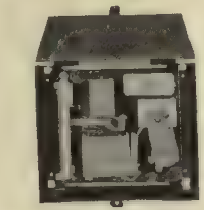

Resistance Boxes


Fuse Boxes

Thermostat


Magnetic Switch

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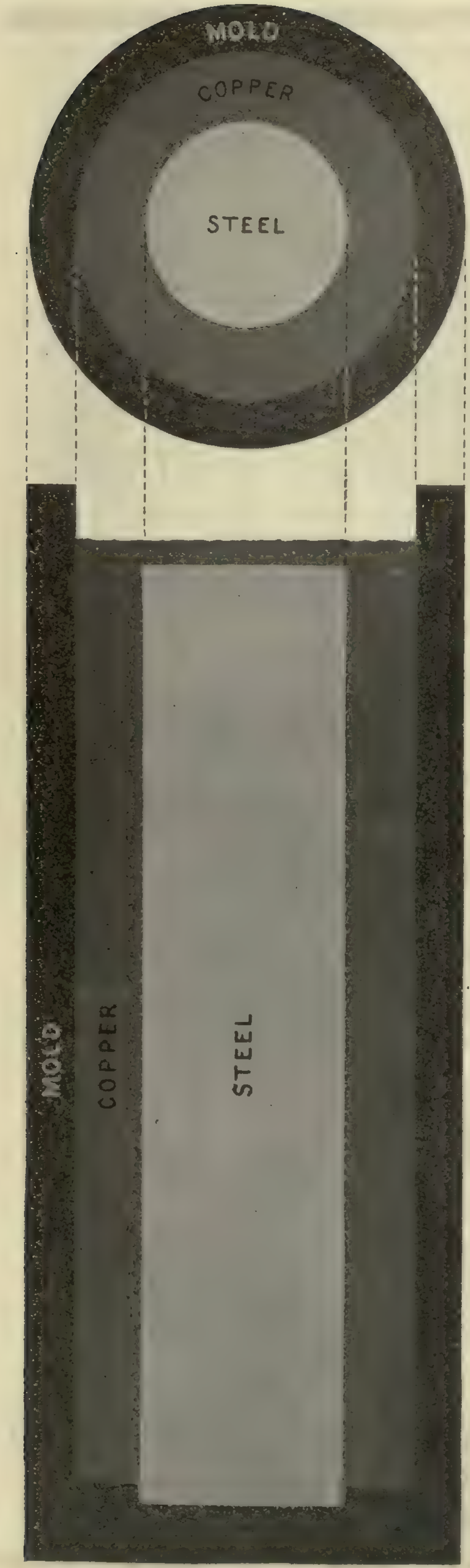

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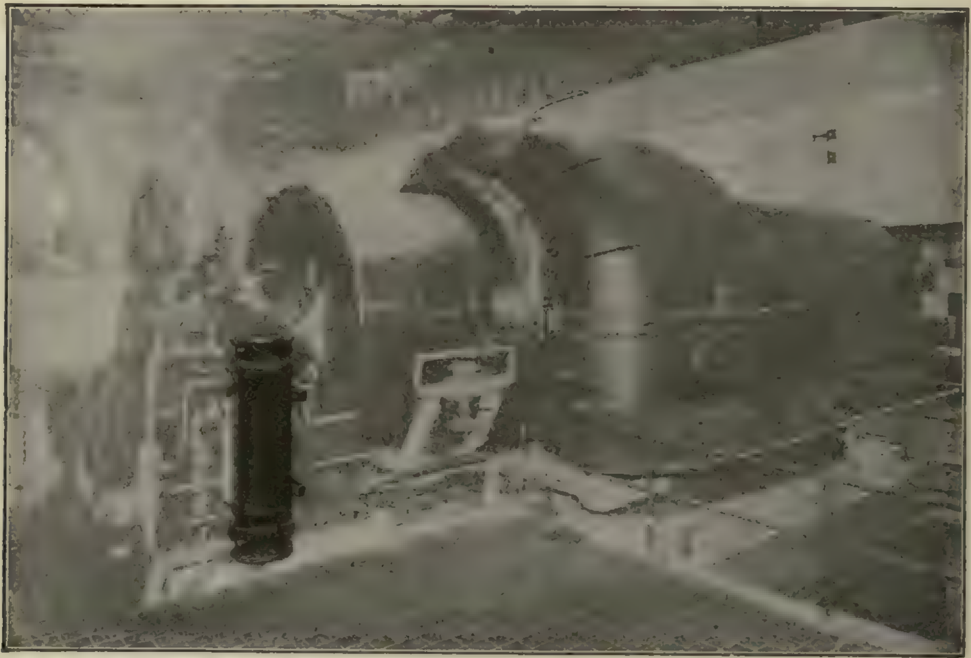

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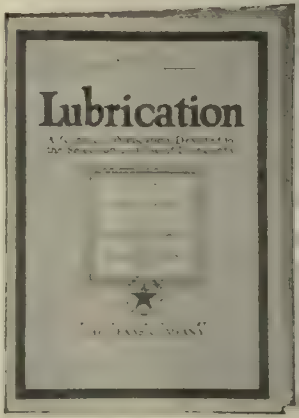
Operating Expense

It is a vital subject and you should have all the facts and figures



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Uppermost in the minds of most electric street railway men is the desire to keep operating expense down to a minimum.

Knowing this, The Texas Company set about to collect facts and figures to demonstrate the important relation of correct lubrication in keeping operating expense down to a minimum

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This issue of our monthly magazine "Lubrication" is devoted exclusively to the lubrication of electric street railways and its relation to keeping down operating expenses.

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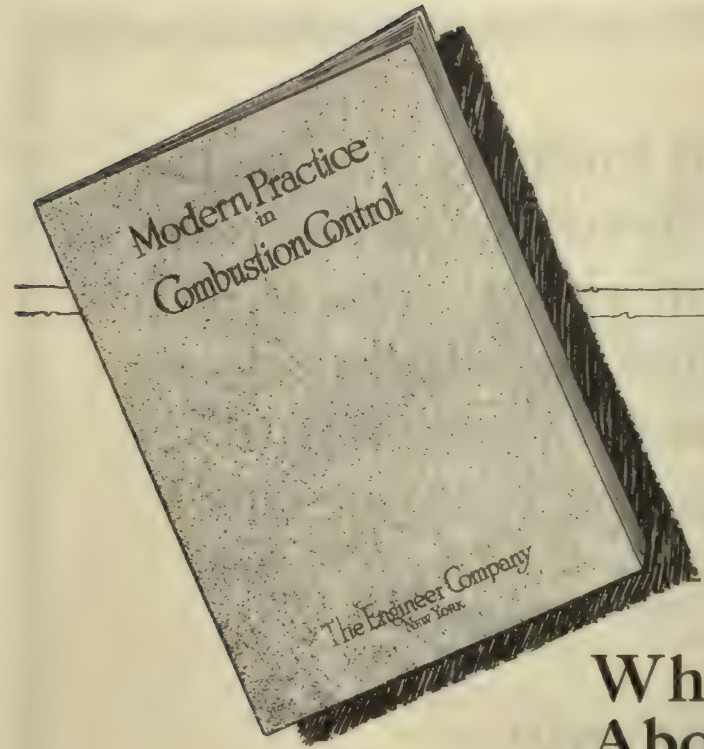
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The Engineer Company
New York

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Kala Luckree

The comic sheets are full of jokes on the length of time it takes an American girl to prepare for the theatre.

But the wildest exaggeration of this is a big underestimate of the time it takes a Mangbettu woman to make her toilet, for she must paint all over — using a Kala Luckree stick dipped into the black juice of the gardenia fruit.

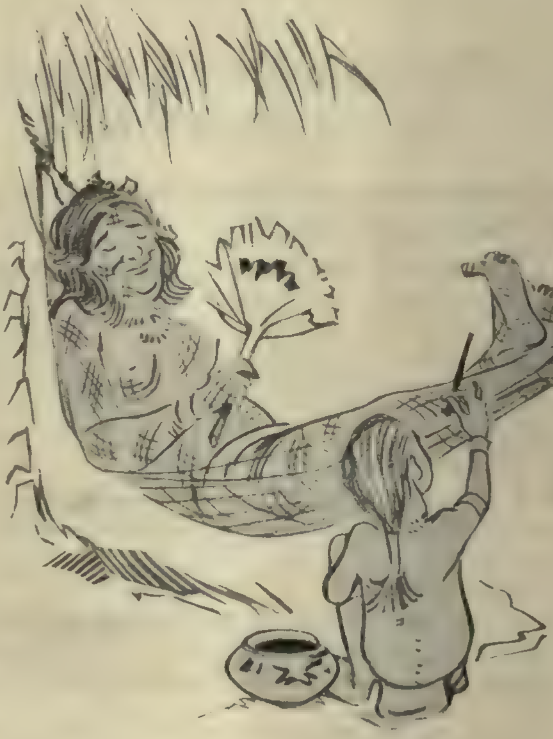
To make up for lack of natural attractiveness her maid must wield the black stick.

It reminds one of the expedients resorted to in order to make a cheap carbon brush render a certain degree of service.

Operators must use the lubricant stick to help out—must true up commutators to help out, and so on and so on.

All this fuss and fake is cleared away at one stroke when you use a prescribed Morganite carbon brush.

It is *naturally* attractive.



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Unfailing vigils throughout the day and night recording impartially and without prejudice the exact time that every car passes a given point, Nachod Headway Recorders enable you to maintain even schedules, equalized loading, discipline of men and the highest efficiency of operation. Like automatic inspectors, they deliver to you each day, in graphic form and with invariable accuracy, a complete history of all car movements at points of installation during the twenty-four-hour period preceding.

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Regardless of the great increases in the cost of materials, artwork, printing, labor and other items, users of Collier Service know that its standards are not only being kept, but even surpassed.

No deterioration is permitted in the quality of the car-card stock or printing; nor a lowering of the artistic standards and originality that have made car-card advertising a respected medium with the shrewdest advertisers of America.

And this adherence to a standard of excellence set by ourselves is matched by faithful adherence to our agreements to pay a fixed sum per month promptly to our electric railway clients, with no attempt whatever to claim indulgence for unforeseen changes in economic conditions.

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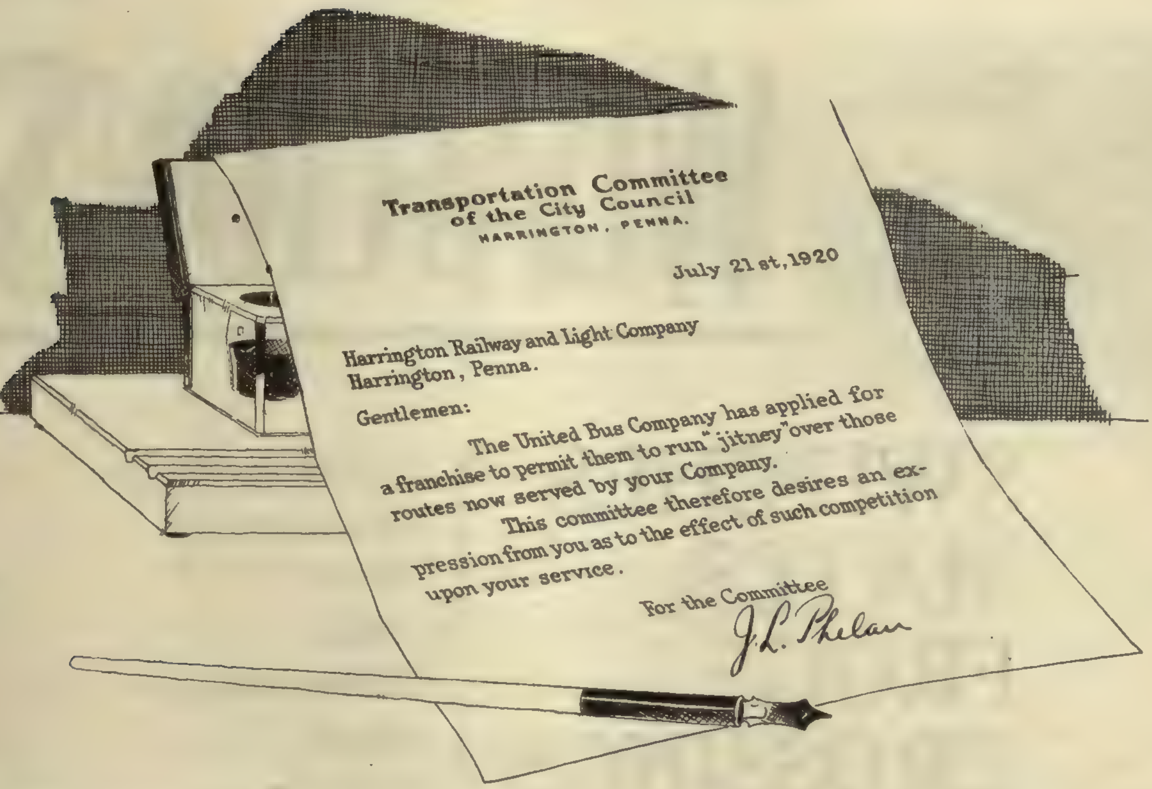

Transportation Committee
of the City Council
HARRINGTON, PENNA.

July 21st, 1920

Harrington Railway and Light Company
Harrington, Penna.

Gentlemen:

The United Bus Company has applied for a franchise to permit them to run "jitney" over those routes now served by your Company.

This committee therefore desires an expression from you as to the effect of such competition upon your service.

For the Committee
J. L. Phelan

How would you answer this letter on the proposed Jitney Franchise?

YOU know, roughly, what the effect of the "jitney" franchise would be upon your company. Any electric railway man can tell his city council, in a general way, that competition of this kind will compel reduction of trolley service or higher fares, or both.

But could you prove it? Could you show that it would affect your credit in case of a new bond issue, and check suburban expansion?

Are you capable of making the essential comparisons between your service and jitney service, on "lean routes", and in central section, and formulating a convincing statement of your findings?

Can you *convince* the city council, not merely tell it, that the public interest is tied up with the welfare of your company?

This is the type of many letters today challenging the leadership of electric railway executives.

It calls for facts; and only the conclusions that are based on facts.

And the key to those facts is knowledge of the fundamentals of business and industry.

It is wholly a matter of knowledge in detail of your own business plus a good knowledge of the principles and practice of all business.

One in Every Ten is a Technical Man

Those fundamentals are within easy reach of any intelligent technical man. Of the thousands of men enrolled for the Alexander Hamilton Institute Course and Service, one in every ten is a technical man who determined to broaden his sphere by adding to his specialty training that all-round knowledge of business without which no man can progress far. To the technical equipment of 12,000 such ambitious men the Institute has contributed and is contributing, a good working knowledge of all departments of modern business—accounting, marketing, office and plant organization, corporation finance, salesmanship, advertising. It is giving them the fundamentals which develop executives out of routine workers.

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Ability to plan more effectively

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Quicker and more accurate decisions

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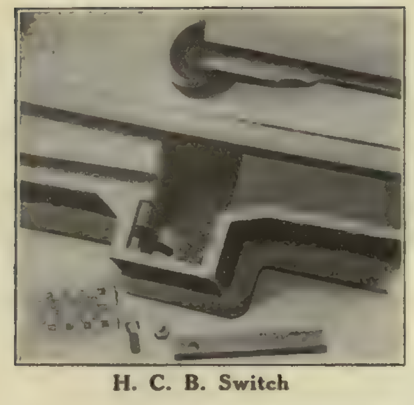

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Solid Manganese Steel and Manganese Steel Insert

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"Originators of Manganese Steel Track Work"

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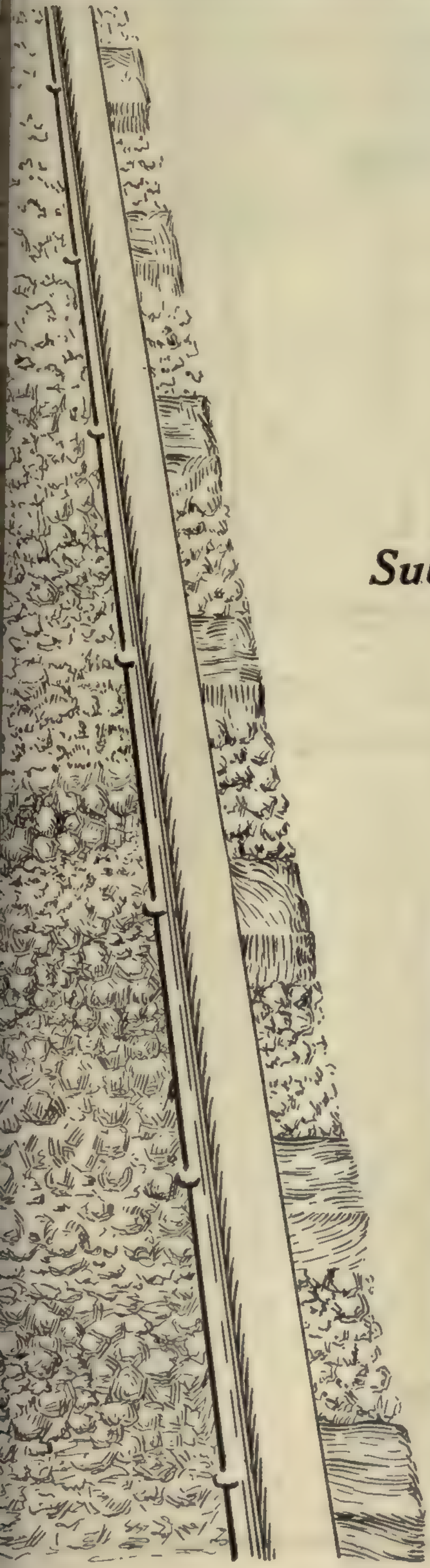
AL TRACK WORK

"GIANT HEEL" Switch



The illustration below gives a comprehensive view of our large Layout Yard, where Special Track Work is assembled and carefully fitted together, to avoid any possibility of trouble during installation. No piece of work leaves our plant without such careful fitting.

Our extensive, modern plant, illustrated on the preceding page, is equipped to fabricate track work of all constructions, Solid Manganese Steel, Manganese Steel Insert, Plain Bolted and Manganese Steel "T" Rail, etc., which coupled with our long experience, places us in a position to supply your needs efficiently.

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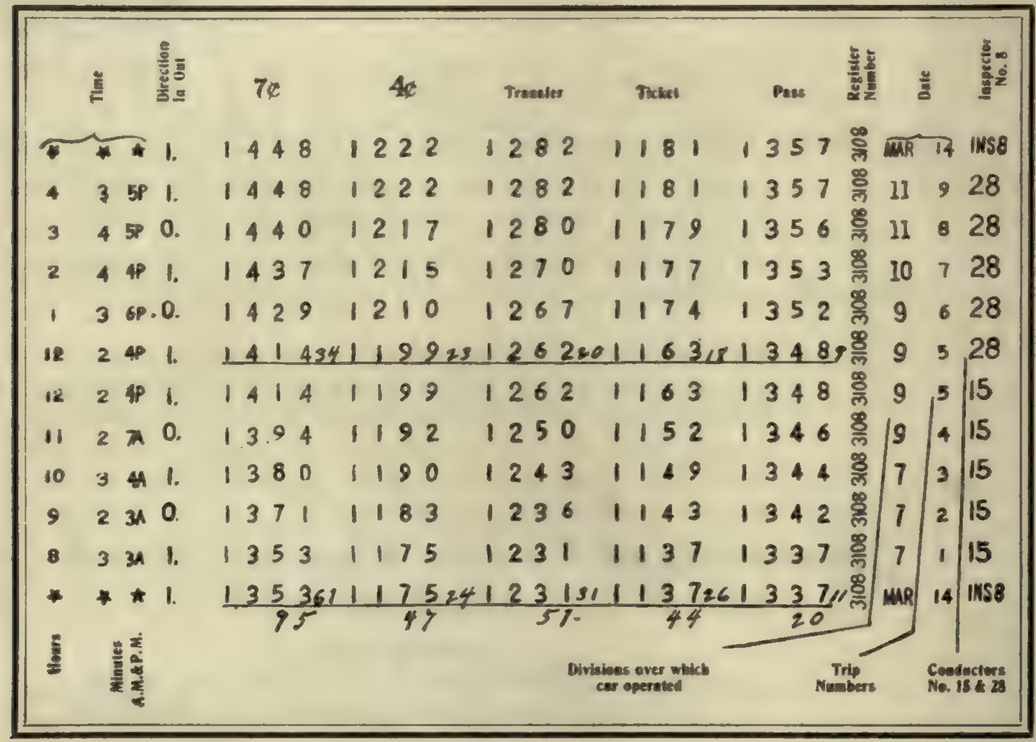
The Ohmer System



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2	4	4P	I.	1437	1215	1270	1177	1353	3108	10	7	28
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				95	47	51-	44	20				

Divisions over which car operated

Trip Numbers

Conductors No. 15 & 28

Every merchant insists that sales shall be recorded, classified, identified as to the salesman, and the amount paid clearly indicated to the purcasher.

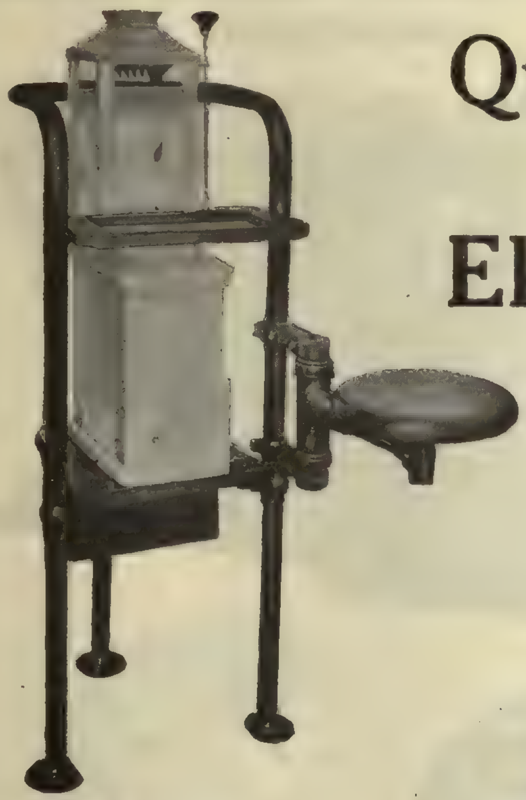
Your conductors sell transportation to a public trained along these lines, and you can best safeguard your fares by utilizing this classifying, recording and indicating principle in your own business by means of the Ohmer System.

The Ohmer System can be applied to your property without tying up any of your capital. We bear the investment burden. Our contracts are sufficiently flexible to take care of changing conditions, increased fare rates, etc., and you need never fear being caught with a lot of obsolete devices on your hands.

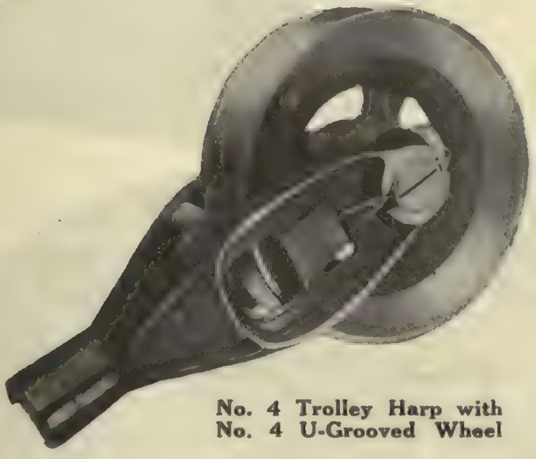
Ohmer Fare Register Company

Dayton, Ohio

Quality Equipment for Progressive Electric Railways



Conductor's Seat



No. 4 Trolley Harp with No. 4 U-Grooved Wheel

CONDUCTOR'S SEAT.

This Conductor's seat is made of malleable iron castings—built strong and substantial for the hardest kind of service. Standard design is made to fit one inch pipe stanchion. The seat is made of best quality maple. The whole equipment is collapsible and will fold flat against any surface, occupying a minimum of space.

MOTORMAN'S SEAT.

Our Motorman's seat is of similar construction with the additional feature, that the seat itself is raised and lowered on a square thread screw.

TROLLEY HARPS AND WHEELS.

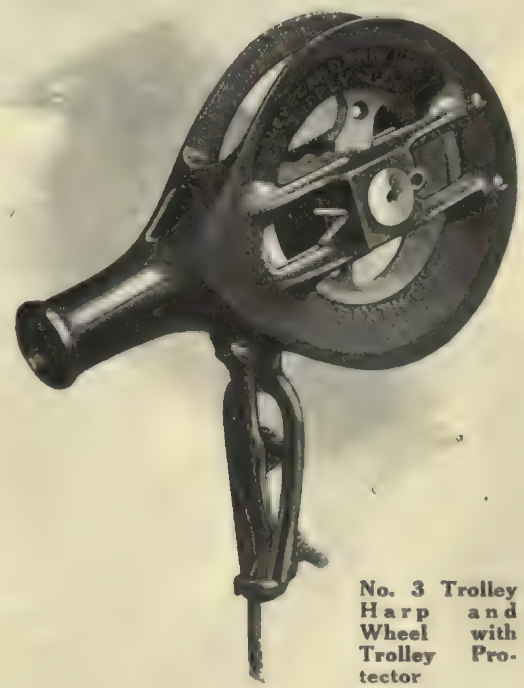
No. 4 Trolley Harp with No. 4 U-Grooved Wheel is heavily constructed and particularly well adapted to interurban service. It has side contact springs and a one inch axle. The construction of wheel and harp prevents catching and tearing of overhead if the wheel leaves the wire.

No. 3 Trolley Harp and Wheel with Trolley Protector has stationary flanges, which assist the wheel in retaining the wire. It has a one inch hollow contact bearing and uses a special wheel, cutting down the cost of 25%, on account of the flanges on the Harp.

OTHER EQUIPMENT.

We also have two designs of trolley bases in use on several roads, one with a ball bearing fulcrum applicable to low overhead lines; Sleet Cutters, Window Catches and various other types of Wheels, Harps and electric railway equipment.

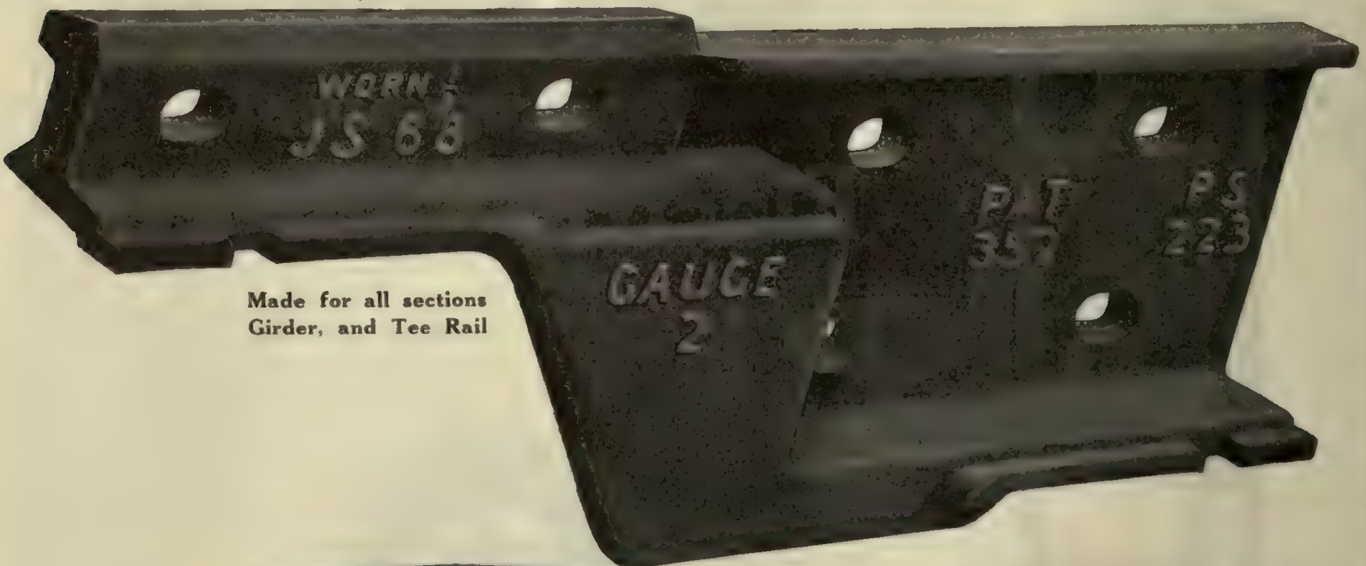
Write to-day for a sample order of any or all of the equipment listed here. Or if you prefer, ask us to send you complete data and prices. No obligations, so write today.



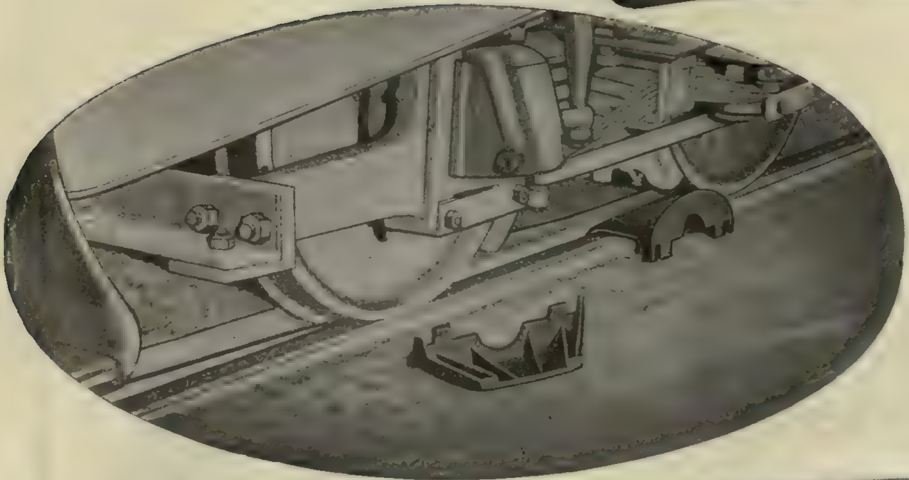
No. 3 Trolley Harp and Wheel with Trolley Protector

ADVANCE MANUFACTURING & TOOL CO.
Cleveland Ohio U. S. A.

READING Aids to Efficient Handling of Mass Transportation

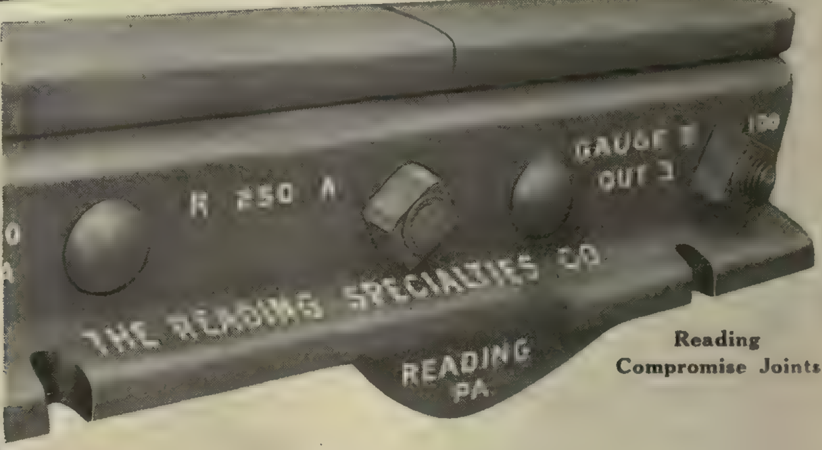


Made for all sections Girder, and Tee Rail



Reading Replacers

Reading Replacers get the car back on the track the first time. A number of types for light and heavy service. Reading Cast Steel Rail Braces are three times stronger than malleable iron. Made for all rail sections. Send for catalog of all the Reading Specialties.



Reading Compromise Joints

Reading Cast Steel Rail Braces

Manufactured and Sold by

READING
Specialties Company

Main Office and Works:

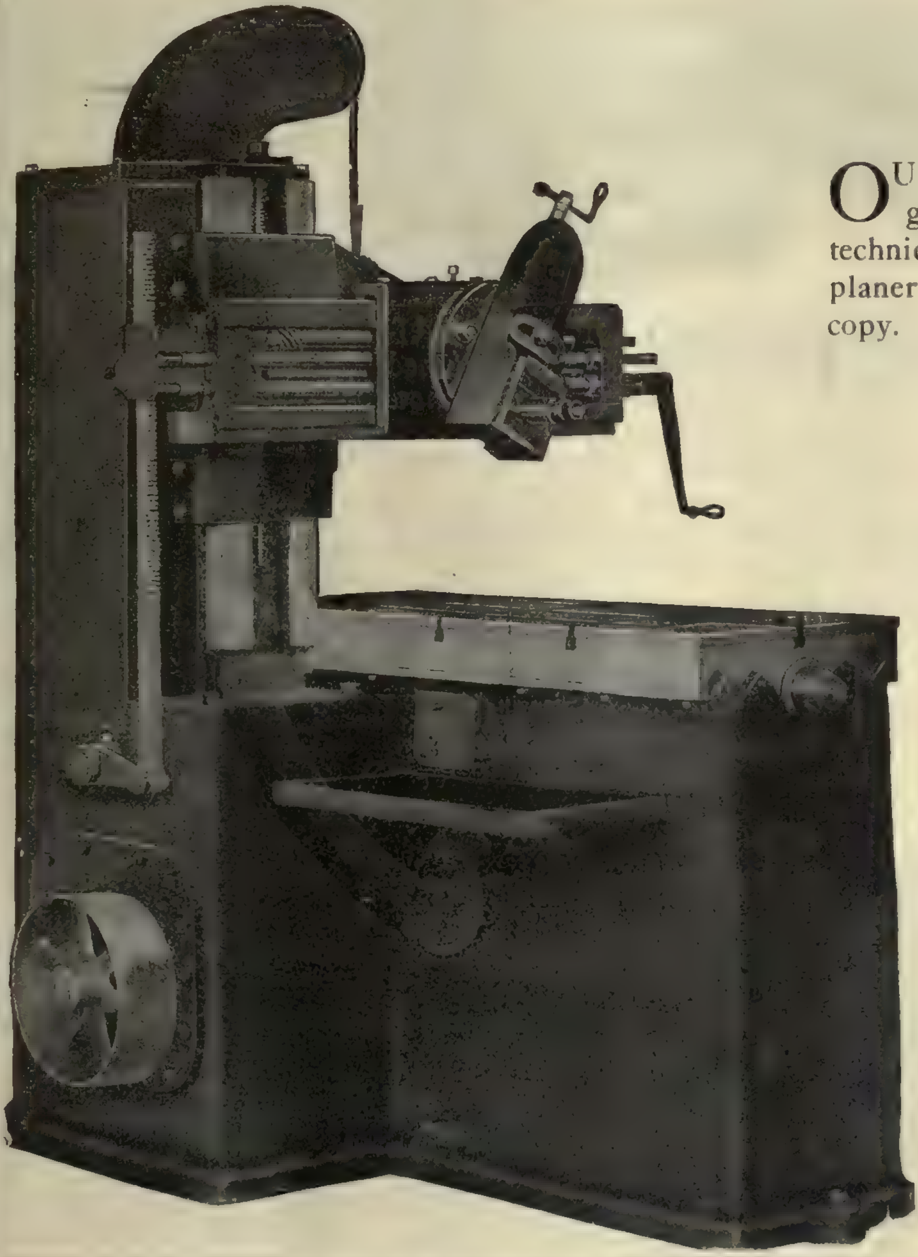
Reading, Pennsylvania

Buying Two—At the Price of One

Practically, that's exactly what you are doing when purchasing a LYND-FARQUHAR Open Side Planer. This one machine both planes and shapes.

It will shape a wide variety of work equally as capably as a special duty machine. It will plane faster and at less cost than the large planer. It fact, much better work can be obtained because the entire casting and the planing operation is within clear view of the operator at all times.

The machine contains all the principal features of the planer and the shaper, and has many important improvements common to neither.



OUR catalogue will give you some technical data on this planer. Send for a copy.

LYND-FARQUHAR COMPANY

Also builders of Wall Radials, and have a large up-to-date stock of modern new and used machine tool equipment.

Boston 9, Mass.

TROLLEY LINE SPECIALTIES
of Superior Quality

OUR STAFF OF ELECTRICAL EXPERTS is composed of practical men who *know* Electric Railway practice from years of intimate daily contact; and our manufacturing facilities are such that we can produce equipment of superior quality.

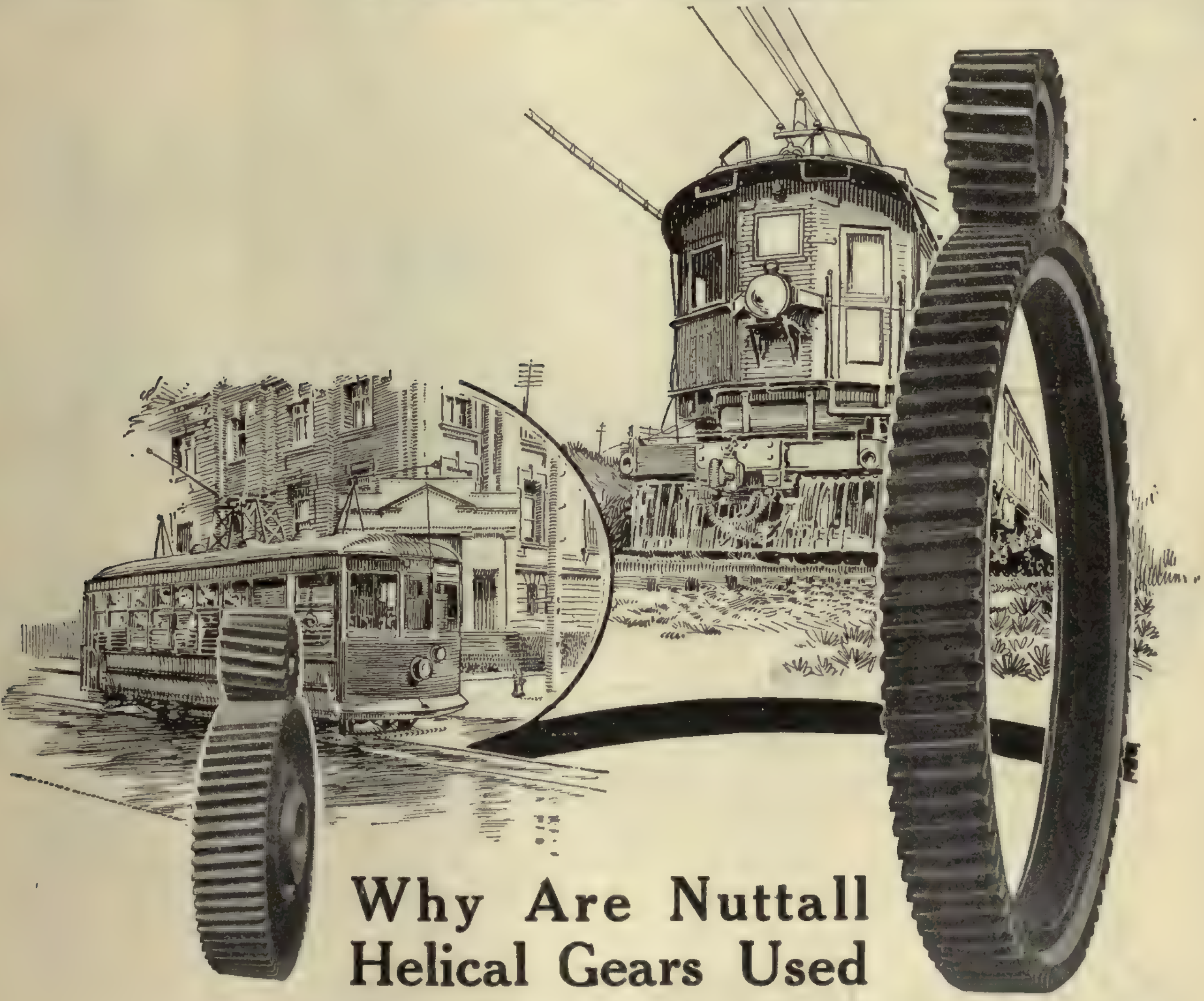
It saves a lot of time, and usually a lot of money, when "Flood City" handles the job.

Write for details

Flood City Mfg. Co.
Johnstown, Pa.

Nuttall Helical Gears

A PROVEN SUCCESS



Why Are Nuttall Helical Gears Used So Extensively?

Why?—A prominent expert on mechanical problems gave the answer in five words:

"The principle is certainly correct."

The mechanical principle of any piece of equipment is what determines the quality of the service it renders. If a wrong principle be applied, failure will ensue but when the principle is correct, the economy and success resulting from its operation is enormous.

Nuttall Helical Gears have the correct principle of power transmission. Two hundred established companies are using them because the teeth mesh smoothly and quietly, transmitting the load without shock or vibration, in this way insuring motors, leads and associated parts against the rapid deterioration caused by vibration.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

Keep the Ma

—and now is the time to consider

Bayonet Sleet Cutters

have no superiors in cutting ice from the wire. If the ice can be removed the Bayonet will do the job. We have the rigid and semi-rotary types (the kind you can back up with) both of which are detachable and interchangeable with the wheel. Only ten seconds necessary to make the change from harp with wheel to one with sleet cutter.

—with BAYONET TROLLEY HARP CO.

BAYONET

sses Moving

"U"

Bayonet Special Trolley Wheels

are made of the very highest grade of metal. No cheap alloys or old trolley wheels recast into new ones. All hand turned, insuring the greatest accuracy and balance. They are known all over the world for their superiority over other wheels, their economical and efficient service having been proved by competitive tests.

"V"

Bayonet Detachable Trolley Harps

are the only harps with which you can change from wheel to sleet cutter or to a new wheel in TEN SECONDS. No tools required on top of the car; only your hand is necessary. All inspections, repairs, adjustments and lubricating are done at the work bench where they are better done. This eliminates unsatisfactory patchwork on top of car, insures perfect running trolleys and increases your trolley wheel mileage at least 33⅓%.

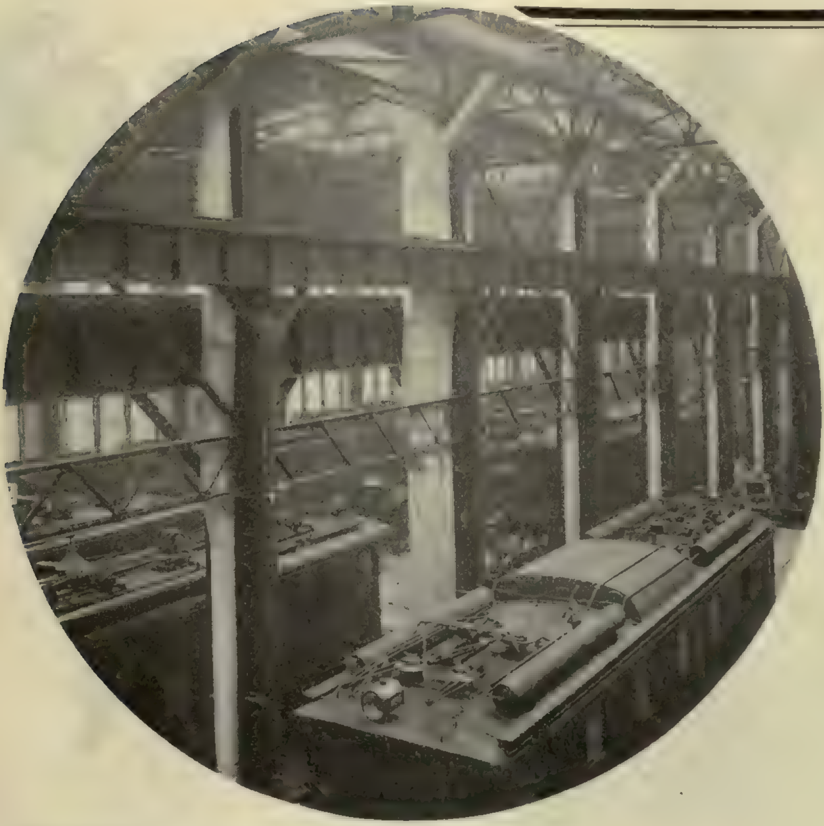
Bayonet Trolley Base With Detachable Pole Clamp

is the only trolley base made on which the trolley pole can be changed in 30 SECONDS and the wheel be in perfect alignment with the wire, and no tools required to do the job. Greatest flexibility of pole action is afforded by long extension springs and self lubricated bushings in bearings, and the roller bearing swivel gives freedom to the rotary motion. It is so constructed that you get a uniform wire pressure at all angles of pole. All wearing parts are quickly and cheaply renewed, making the main parts of the base everlasting.

Perfect conductivity is afforded by sliding contact between turret and base plate. It saves your overhead, your wheels and your wire by its freedom of action.

SPRINGFIELD, OHIO, U. S. A.

TROLLEY EQUIPMENT



There Are No Secrets About Perfection Journal Box Packing

and there are only two things to check up

1. ***Be positive you have the genuine Perfection Journal Box Packing.***
2. ***Then use the correct method of packing outlined below.***

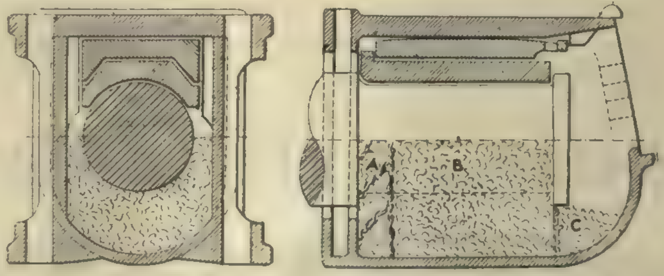
Application of Packing: (a) Inner—In packing a journal box twist somewhat tightly a rope of packing and place it in the extreme back part of the box, as shown at A in the accompanying drawing. Make sure that it is well up against the journal so as to properly lubricate the fillet on the journal and keep out the dust.

(b) Main—Apply sufficient packing (preferably in one piece) to fill the space shown at B. Take care to have this packing bear evenly along full length of the lower half of the journal. The packing should not be too tight, but should be tight enough to overcome any tendency to settle away from the journal. The packing should extend to approximately the center line of the journal, but not above at any point, and should be pressed down evenly at sides so that no loose ends may work up under the journal bearings.

(c) Outer—Apply a third piece of firmly twisted packing, as shown at C, and pack tightly in order to prevent displacement of the main packing. There should be no loose ends hanging out of the box, as they would tend to draw out the oil.

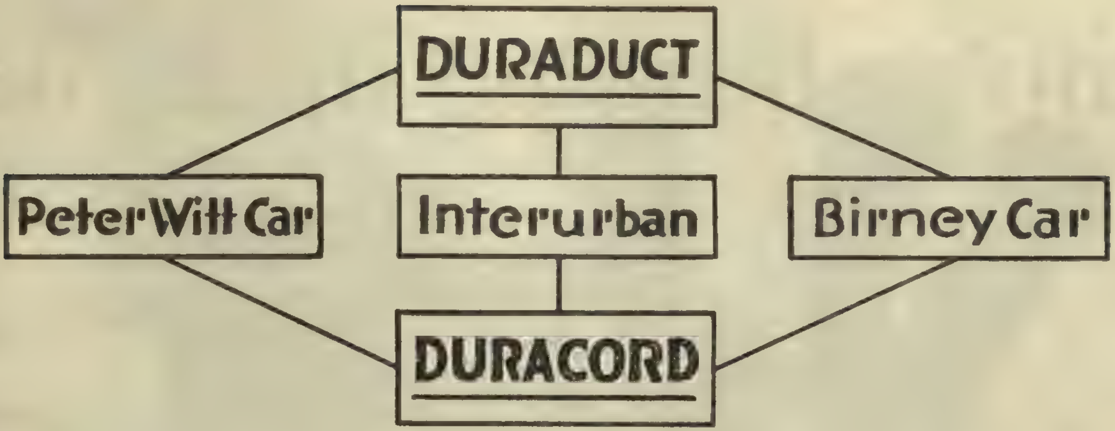
Franklin Perfection is a product developed after years of careful study and experience along journal box packing lines. To use it means to minimize hot boxes and thereby stop their harmful results.

It will pay you to investigate and send for samples, because once a customer always a customer.



The Franklin Manufacturing Company

Franklin, Pa.



No Railway Transport is Complete Without

DURADUCT

The Quality Conduit

DURACORD

The Quality Cord

Since 1913 thousands of cars—singly or in trains—from safety to interurban have been protected by Duraduct, the original non-metallic single wall woven conduit with the black dotted line on the interior.

On every kind of circuit from controller cables to push button wiring.

Duraduct reduces first cost in material and labor, cuts nearly 90% in the weight of the conduit, makes wiring easily accessible for changing due to new auxiliaries, avoids short circuits from sweating of metal conduit, and, not least, furnishes a roller bearing runway that has no sharp points to injure insulation.

And now Duracord is at your service to give you a long-lived insulated woven-cover wire suitable not only for every place in shop or on the line where portable cords are customary, but also for more severe service such as wiring between trains, motor leads and other applications where twisting, chafing and weathering must be encountered and overcome.

Let us send you samples of Duracord and the ordinary kind so you can appreciate why we call Duracord "The Quality Cord"

Tubular Woven Fabric Co., Pawtucket, R. I.

You're burning up money

if your average rivet spoilage by burning and scaling is the usual 15%

You can stop this waste and effect other economies—

at the same time improve working conditions—by installing Berwick Electric Rivet Heaters.

We've used 50 of these heaters in our own shops for six years. One hundred and fifteen other manufacturers are using them—495 heaters altogether.

They have proven economical in operation, consuming not more than 20 kilowatt-hours per hundred pounds of rivets heated. They eliminate smoke, fumes, dirt, and excessive heat radiation. They produce hot rivets in 20 to 30 seconds after starting. They are conveniently portable, simple to operate and safe.

Nine standard types and sizes for all rivets up to 1½ in. x 10 in. or larger; capacities up to 600 hot rivets per hour.

Investigate Electric Heating of Rivets!

end for catalogue. Please state ivet requirements and alternating urrent conditions.

American Car and Foundry Company

CHICAGO 165 Broadway, NEW YORK ST. LOUIS

Railway coach, dining and sleeping cars; express, baggage and mail cars; electric railway cars; freight cars, including box, flat, gondola, hopper, dumping and tank types and cabooses; special purpose cars for carrying cane, live stock, etc.; industrial, mine and logging cars; car parts, including trucks, coupler pins and links, and chilled cast iron wheels; electric rivet heaters; bar iron and steel; bolts, nuts and rivets; iron-body gate valves; flanged pipe.

BERWICK ELECTRIC RIVET HEATER

Cut Down
Trolley Wheel Maintenance

Rust and gummy wheels and harps will never trouble you provided you specify "Bound Brook" Oil-less Bearings because they have a self-contained lubricant that never gives out.

"Bound Brook" Trolley Wheel Bushings have only one cost—the purchase price. Once installed, they do not need continuous attention, and their longer wearing qualities and smooth-running efficiency reduce their cost-per-mile-of-service to a figure greatly below that of other bushings.

The bushing life ranges from a minimum of 8600 to a maximum of 27,633 miles or more.

Moreover "Bound Brook" Oil-less Trolley Wheel Bushings are now used by two-thirds of America's electric railway systems.

All Genuine Graphited Oil-less Bushings have always been made at Bound Brook, U. S. A.

Bound Brook Oil-less Bearing Co.

Specialists in the manufacture of Oil-less Bushings for more than a third of a century.

Bound Brook, New Jersey

Detroit Office, 1723 Ford Bldg.

"BOUND BROOK"

Trade-Mark Reg. U. S. Pat. Off.

TROLLEY WHEEL BUSHINGS

EARLL
Catchers and Retrievers

For Safety Cars For City Cars
For High Speed Interurban Cars

FOR SAFETY CARS use the Earll No. 10 Catcher, or No. 4-A-S Retriever, specially designed for City Service—there are sound reasons for using light Retrievers on Safety Cars.

FOR ORDINARY CITY OR SUBURBAN CARS use the Earll No. 7 or No. 10 Catcher, or the No. 4-A-S Retriever.

FOR HIGH SPEED INTERURBAN CARS use Earll No. 4-A-L or No. 5-A-L Retrievers.

Simplicity of design enables us to produce the lightest Catchers and Retrievers with the fewest and most rugged parts—and, besides, there are the Ratchet Wind, the Emergency Release, the Drum Check, the Free Winding Tension Spring and a number of other valuable features peculiar to the Earll Catchers and Retrievers. Let us explain and demonstrate them to you at Space 633 at the Convention or on your cars at our expense.

C. I. EARLL
York, Pa.

A. E. R. A.
Standard Brake Shoes

For All Cars—Always
Reinforced Diamond "S"
is the Best Type

FOR
SAFETY CARS
Pattern D 67 for 2¾-in. Tread Wheels
Pattern D 87 for 3-in. Tread Wheels

AMERICAN
BRAKE SHOE AND FOUNDRY COMPANY
30 Church Street, New York
332 S. Michigan Avenue, Chicago
Chattanooga, Tenn.

Why do they all single out Tool Steel Gears and Pinions?

In the American Association magazine, AERA, December, 1919 and January, 1920, someone put the following question:

E-e-347. **Will you please give your opinion of a good, fair mileage for treated, untreated, hardened and tool steel gears and pinions?**

The following answers were received and printed:

E. C. FOSTER, *President*, MANCHESTER STREET RAILWAY CO., MANCHESTER, N. H.—Non treated gears city traffic, 50,000 miles; interurban, 75,000 miles. Making tests on hard steel gears.

R. L. JONES, *Master Mechanic*, MASSACHUSETTS NORTHEASTERN STREET RAILWAY CO., HAVERHILL, MASS.—I have no absolute correct data on treated and untreated gears. We have some tool gears and pinions that have run 275,000 miles and have shown hardly any wear.

F. H. HARRIS, *Superintendent of Equipment*, CHARLESTON CONSOLIDATED RAILWAY AND LIGHTING CO., CHARLESTON, S. C. At present we are using nothing but tool steel gears and pinions, except on some new equipments, but as we have as yet not worn any out, we can not give any definite information on this subject.

H. W. DEININGER, *General Superintendent*, IOWA SOUTHERN UTILITIES COMPANY, CENTERVILLE, IOWA.—We get approximately 250,000 miles from untreated pinions, or about four years' daily service on untreated gears. We have some on which we have kept a record, which have run 385,000 miles with very little signs of wear. Will probably reach 500,000 or 600,000 miles.

C. H. NELSON, *Superintendent*, GRAYS HARBOR RAILWAY & LIGHT CO., ABERDEEN, WASH. —Indefinite; practically no trouble.

RALPH A. GILL, *Manager's Secretary*, EL PASO ELECTRIC RAILWAY CO., EL PASO, TEX.—For treated tool steel gears, 300,000 miles. Pinions 180,000 miles.

EDWARD A. WEST, *General Superintendent*, THE DENVER TRAMWAY CO., DENVER, COLO. —In Denver service untreated pinions average 40,000 miles; treated average 55,000 miles. *Tool steel pinions running with tool steel gears average* 300,000 *miles.* Tool steel gears for which we have mileage records show 755,661 miles.

C. C. SLATER, *General Superintendent*, THE COLUMBUS RAILWAY, POWER & LIGHT CO., COLUMBUS, O.—It is impossible for us to give a fair answer to this question as operating conditions are the determining factors in gear life.

SUMMARY

Six definite answers, of which four companies regularly using Tool Steel gears, (and look at the dandy records they show) one company is testing, one company satisfied with untreated. No one seemed sufficiently enthused about those "just as good as Tool Steel—special quenched gears" to even record their tests.

The "live wires" of the industry who follow tests and use the question box for the experience of others, are almost always "boosters" for Tool Steel gears.

There's a Reason!

Exide

BATTERIES

A Factor of Vital Importance in the Safe and Efficient Operation of

Electric Railways

In almost every section of the country, Exide Batteries are playing an indispensable part in railway work.

Within the power house or substation they are an important factor in ***load regulation***—either directly on the circuit or in ***stand-by service*** for the ***exciter bus*** and for ***emergency lighting*** — or again, in the operation of ***oil switches.***

On the cars, it has been used entirely for propulsion, for multiple unit control, or for emergency lighting.

On the line, Exide Batteries are an aid to overcoming fluctuations in voltage.

Have you availed yourself of this convenient source of power as fully as you should

Detailed information regarding storage battery service, on request.

THE ELECTRIC STORAGE BATTERY CO.

Oldest and largest manufacturers in the world of storage batteries for every purpose.

1888 PHILADELPHIA 1920

Branches in 17 Cities

Special Canadian Representatives: Chas. E. Goad Engineering Co., Ltd., Toronto and Montreal

The Home of Midvale Tool Steels as Seen From an Airplane

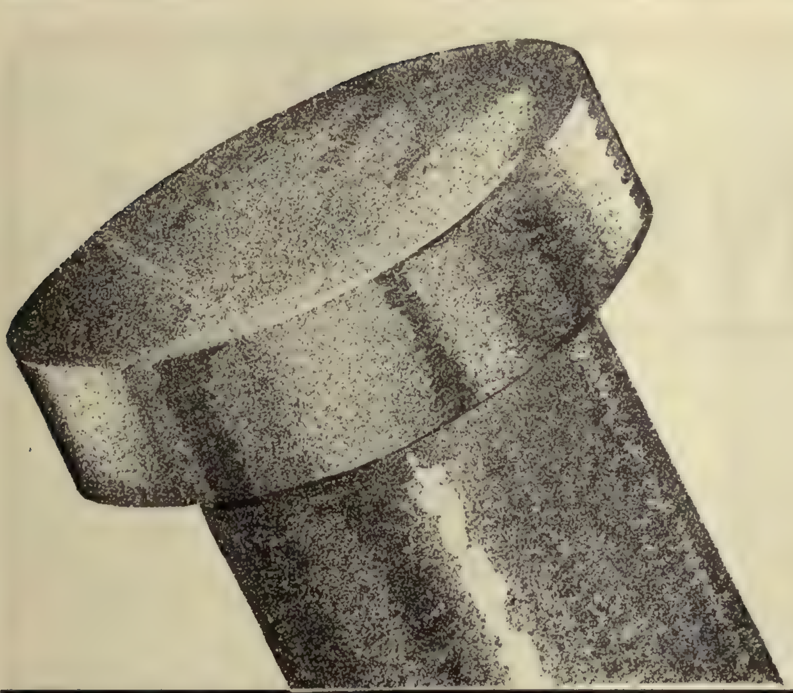
MIDVALE carbon, special alloy and high speed tool steels can be furnished to meet any requirements. Prompt deliveries, insured by complete warehouse stocks, and our long experience in the manufacture and applications of tool steels which is at your disposal, make it profitable to specify Midvale brands.

MIDVALE STEEL AND ORDNANCE COMPANY
CAMBRIA STEEL COMPANY

General Sales Office: Widener Building, Philadelphia, Pa.
District Sales Offices:
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia
Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis

Sole Export Representatives:
Consolidated Steel Corporation, 165 Broadway, New York
All export inquiries should be sent to this address

Series Number 36-1



Traffic Man and Equipment Man tell the Purchasing Agent why you want

Boyerized Pins and Bushings

Don't blame the P. A. for trying to keep material expenses down when he asks you to specify something seemingly cheaper. That's part of his business in life.

Just tell him that when it comes to Boyerized Pins and Bushings versus any other kind exactly what your reasons are for specifying what is really the cheapest in the long run *because* of its long run.

You, Mr. Traffic Man, tell him of the accidents that might have been if the brake rigging had played false at a critical moment.

You, Mr. Equipment Man, tell him of the labor saved and the money saved by using pins, bushings and other Boyerized specialties that give so much more wear than the so-called "cheap" article.

That's all any reasonable Purchasing Agent wants to know.

To Boyerize means:

Boyerized Brake Lever Pins and Bushings

Boyerized Brake Hangers

Boyerized Wearing Plates between the Bolster and Bolster Carrier

Boyerized Wearing Plates between the Pedestal Straps and the Journal Box

Bemis Car Truck Company
Electric Railway Supplies
Springfield, Mass.

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

"The 'Standard' Brand on your material is an assurance of eventual economy."

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

500 NORTH BROAD ST., PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA

RICHMOND
SAN FRANCISCO
NEW YORK
MONTEREY, MEX.

MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

CYPRESS

"THE WOOD ETERNAL"

is NOT the *Best Lumber for ALL Railway Purposes*. For certain specific applications, however, in which railways have large lumber requirements, the use of all-heart Cypress develops very large *economies* in *maintenance costs*. For example, the Railway Signal Association in its standard specifications for wood to be used for "Trunking and Capping" has always placed all-heart Cypress among the first choices in the list of suitable woods.

The Railway Signal Association makes its recommendations as a result of definite *knowledge* of the subject, and its membership includes many able men who are Cypress enthusiasts. We gladly refer all doubters as to Cypress superiority to any well-posted railway engineer who has had experience with Cypress, "the wood eternal."

The same conditions of service which make Cypress superior for "Trunking and Capping" are present in many other railway lumber requirements, such as

FENCING

and similar purposes where the material is exposed constantly to the weather, and where it is consequently essential that it shall be highly capable of *resistance to decay*. That is the great and particular value of Cypress—it is *highly resistant to decay*. (All-heart especially.)

If railway men in general will study the question of wood durability for other uses as carefully as Railway Signal men have studied it in connection with "Trunking and Capping," there will be a lot more all-heart Cypress used in railway service—*to the very great economy of the companies using it.*

Our data is at your service.

SOUTHERN CYPRESS MFRS' ASS'N

1265 Perdido Building, New Orleans, La., or
1265 Heard National Bank Building, Jacksonville, Fla.

BATES
STEEL POLES
are IDEAL for
ELECTRIC RAILWAYS
TRANSMISSION LINES
STREET LIGHTING
SIGNAL SYSTEMS

Bates One-Piece Steel Poles possess in the *Highest Degree* the following requisites of

MODERN STEEL POLES:
SAFETY
RELIABILITY
PERMANENCY
LOW FIRST COST
SCIENTIFIC DESIGN
ARTISTIC APPEARANCE
LOW MAINTENANCE COST

Large Stocks of Standard Poles are always available for IMMEDIATE SHIPMENT

Our New 1921 TREATISE AND HANDBOOK sent upon request.

Bates Expanded Steel Truss Co.

208 South La Salle Street
CHICAGO, ILLINOIS

Combined Trolley and Lighting Poles

In this installation recently completed, Massey hollow reinforced concrete poles were adapted to use both as ornamental lighting standards and trolley supports.

In addition to this advantage of adaptability, Massey poles—made by our special centrifugal process—are light in weight, strong, durable and particularly pleasing in appearance.

Eliminate pole maintenance by ordering Massey concrete poles now.

Massey Concrete Products Corporation
Peoples Gas Bldg., Chicago

New York, 50 Church St.
Dallas, Sumpter Bldg.
Pittsburgh, Oliver Bldg.
St. Louis, Ry. Exch. Bldg.
Atlanta, Candler Bldg.
Salt Lake City, 925 S. 6th St., W.

ANDERSON

Round Top Straight Line Suspension

line material is the natural result of years of experience in serving hundreds of electric railways.

Actual knowledge of real working conditions has brought about a quality of equipment that is unsurpassed.

Each Anderson specialty was designed for a particular purpose.

Properly installed, its service will prove to you its guarantee of satisfaction.

Write today for Copy of Catalog 8

ALBERT & J. M. ANDERSON MANUFACTURING CO.
289-293 A STREET, BOSTON, MASS., U. S. A.

NEW YORK, 135 Broadway
PHILADELPHIA: 429 Real Estate Trust Bldg.
LONDON: W. 1, 191 Tottenham Court Road
CHICAGO, 105 S. Dearborn St.

Special Standard Bronze
High Strength S. S. B. Trolley Wire

Unexcelled for durability, reliability, economy under most severe operating conditions.

Standard Underground Cable Co.
Pittsburgh, Pa.

OKONITE
TRADE MARK
REG. U. S. PATENT OFFICE.

Varnished Cambric
Wires and Cables

are made with the same care and high regard for quality which distinguishes the production of Okonite rubber insulation.

We are prepared to handle any high-grade proposition, and solicit your inquiries.

"Manson" Tape (*Friction*), "Okonite" Tape (*Splicing Compound*)

The Okonite Company, Passaic, New Jersey
Incorporated 1884
Central Electric Co., Chicago, Ill., General Western Agents
F. D. Lawrence Electric Co., Cincinnati, O. Novelty Electric Co., Philadelphia, Pa. Pettingell-Andrews Co., Boston, Mass.

No wonder nearly every important street railway uses the

"CHEATHAM SWITCH"

—it's rugged, simple, economical, and saves time and labor.

Write the

CHEATHAM ELECTRIC SWITCHING DEVICE CO.

4781 Louisville Avenue, Louisville, Ky.

Dossert Connectors used in bus bar compartments for making taps.

Dossert

Connectors

Dossert Connectors and taps make good wherever used because they are built right.

They are easily removed for cutting out a line or for test purposes.

On the Chicago, Milwaukee & St. Paul Railway they were used intensively both in the power house at Great Falls and in the substations along the line in making cable splices, tapping branch circuits, and in making bus connections.

Dossert Solderless Connectors eliminate rubber spoilage by heat of soldering

They are your one best bet. Just drop a line for catalog 15

DOSSERT & COMPANY

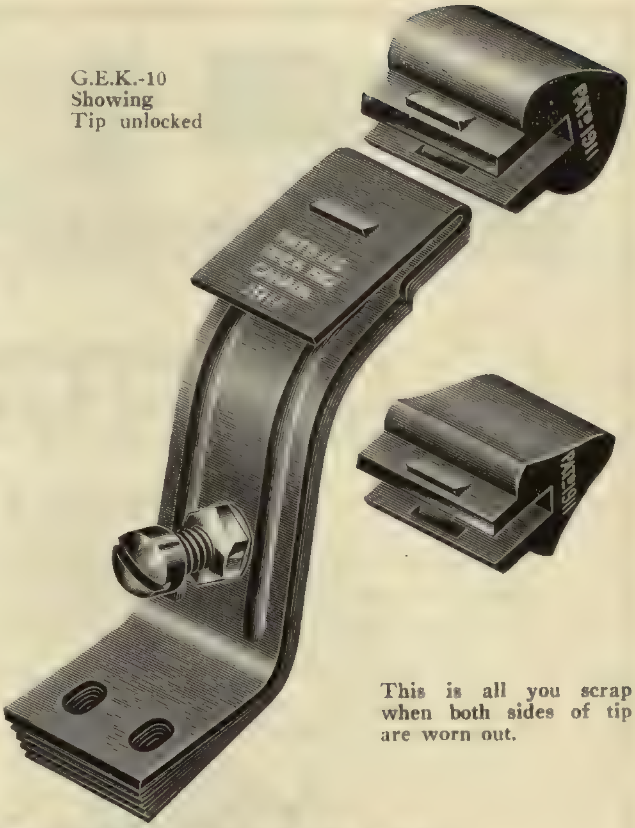
H. B. LOGAN, President **242 West 41st Street, New York**

We don't make all the controller fingers used but we make the best—and every year adds to our long list of customers and those who once use triggerlock reversible controller fingers always want them as standard—in the past nine months our sales are fifty per cent more than during the whole of last year, and as the major part of this is to our old friends we are assured that they are obtaining perfect service—

There is a triggerlock finger for every type of controller. Specify them on your next requisition.

Call on us when at the convention.

G.E.K.-10
Showing
Tip unlocked

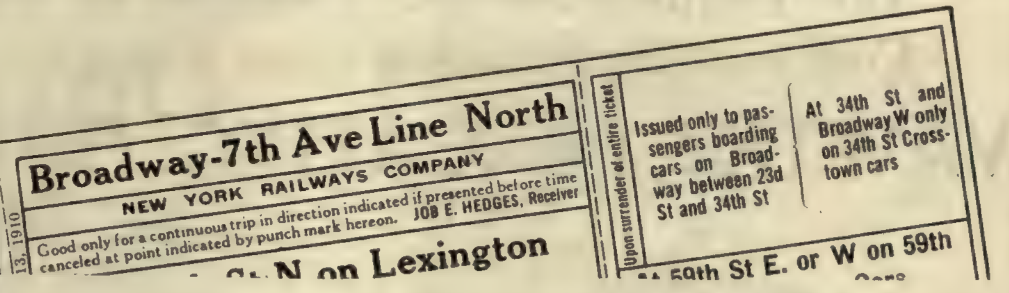


This is all you scrap when both sides of tip are worn out.

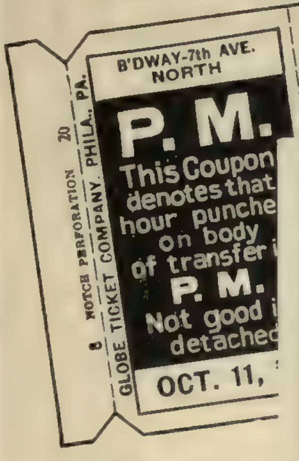
RUSSELL MANUFACTURING COMPANY

814-18 Bath Ave., Niagara Falls, N. Y.

557 King St., West, Toronto, Canada



Broadway-7th Ave Line North
NEW YORK RAILWAYS COMPANY
Good only for a continuous trip in direction indicated if presented before time canceled at point indicated by punch mark hereon. JOB E. HEDGES, Receiver
13, 1910
N on Lexington
Upon surrender of entire ticket
Issued only to passengers boarding cars on Broadway between 23d St and 34th St
At 34th St and Broadway W only on 34th St Crosstown cars
59th St E. or W on 59th



B'DWAY-7th AVE. NORTH
P. M.
This Coupon denotes that hour punche on body of transfer
P. M.
Not good i detachec
OCT. 11,
GLOBE TICKET COMPANY, PHILA., PA.
8 NOTCH PERFORATION 20

P. M. COUPON TRANSFERS

Present-day operating conditions demand quick action by conductors when issuing and receiving transfers. No form gives such instantaneous action nor eliminates abuse so completely as the P.M. Coupon Transfer. They have been used continuously by some large systems for more than fifteen years.

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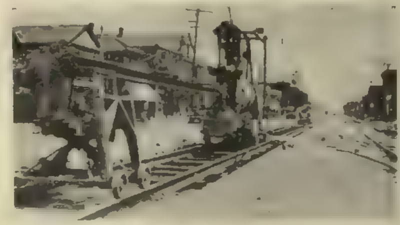

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Steel Cross Ties

it is not an annual renewal proposition. The track is put down to stay, the smoothest and most permanent track obtainable. The views above show steel ties being laid on St. Clair Avenue, Cleveland, Ohio.

Practical use over a period of fifteen years has established steel cross ties as an effective and efficient substitute for wood. Interesting examples of roadbed construction are contained in the pamphlet—Steel Cross Ties—a copy of which may be obtained from any district office.

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General Offices: Carnegie Building, Pittsburgh, Pa.

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12. Range practically unlimited.
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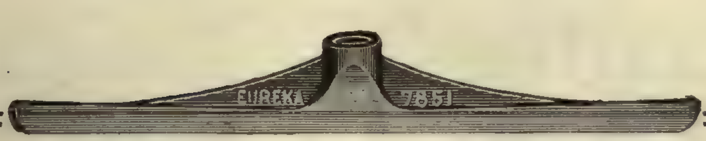

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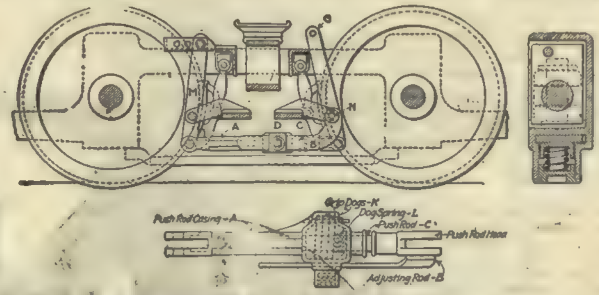

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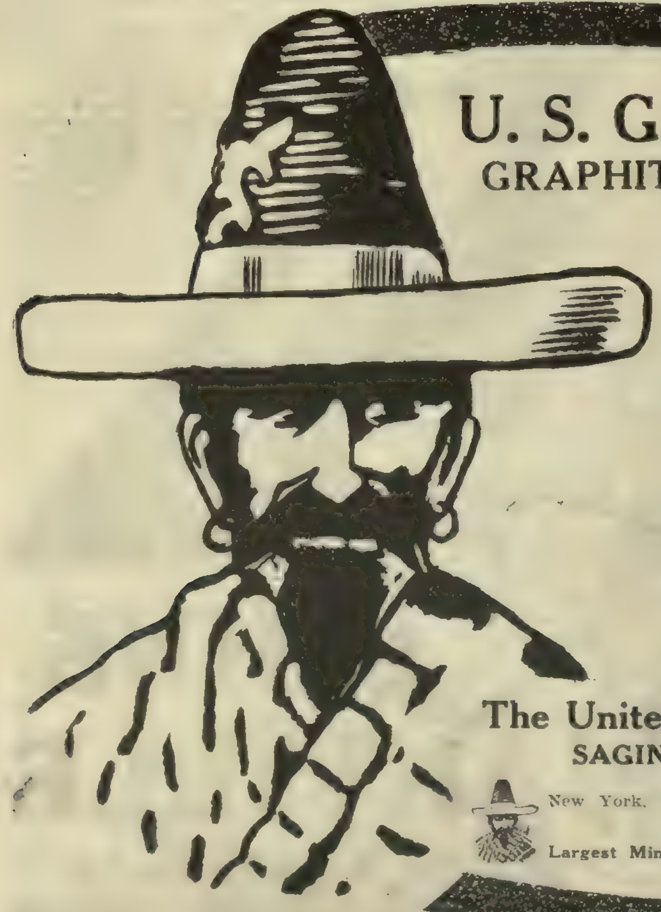

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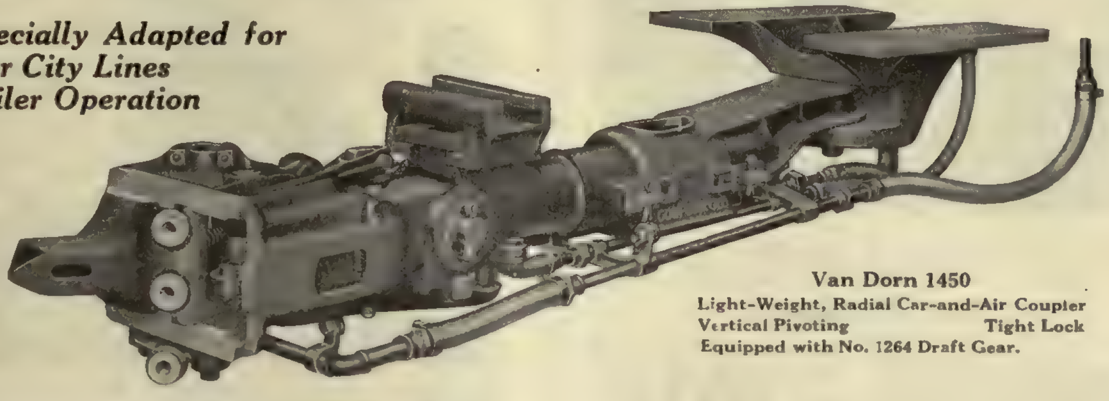

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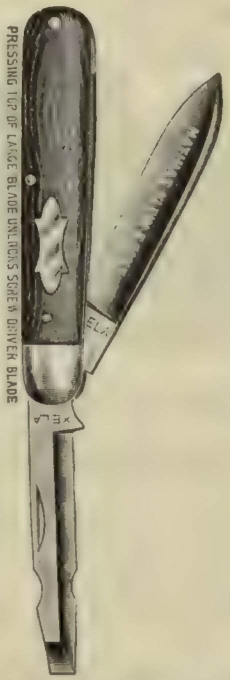
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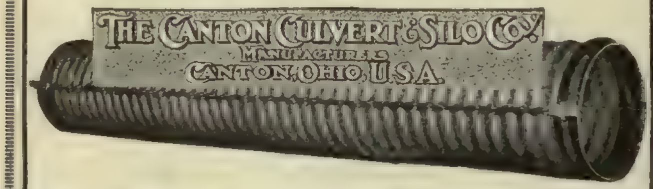

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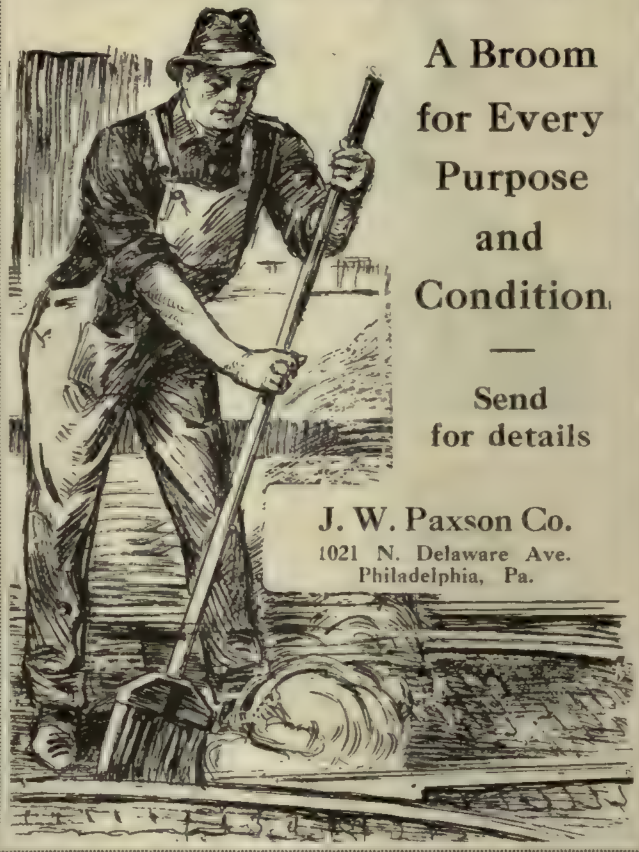

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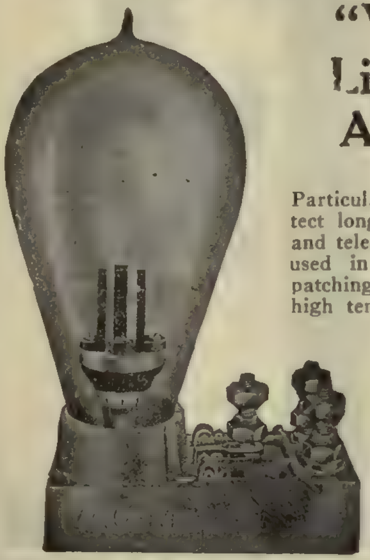

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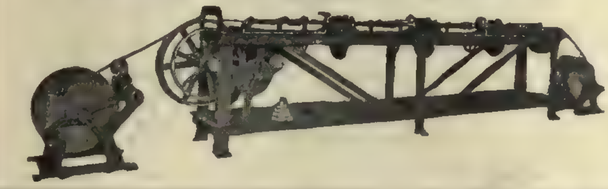

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their tool steel dies last the longest.

Their finely tempered springs never break.

Their workmanship has always measured up to an ideal.

Send for Catalog

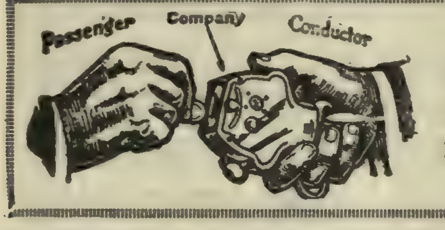
Bonney-Vehslage Tool Co.
Newark, N. J.

DREW MOTORMEN'S SAFETY MIRRORS

Eliminate Accidents

Send for Catalogue No. 18

DREW ELECTRIC & MFG. CO.
Collamer Ave. and Nickel Plate
Railroad, Cleveland, O.



Direct Automatic Registration
By the
Passenger

Rooke Automatic Register Co.
Providence, R. I.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

"It Behooves You to Hooverize Your Motormen"

We can help you
Write to
The Arthur Power-Saving Recorder Co.
2nd National Bank Bldg., New Haven, Conn.

Use them in your terminals—
PEREY TURNSTILES or PASSIMETERS

Faster than the ticket seller

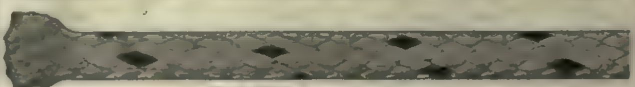
Perey Manufacturing Co., Inc.
30 Church Street, New York City

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

The Cooper Heater Company
Carlisle, Pa.

SAMSON SPOT WATERPROOFED TROLLEY CORD



Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished.
Carefully inspected and guaranteed free from flaws.
Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

Badges Buttons and Punches that last—are a good investment

Specify "American Brand"

For fifty years we have served American Railways in the supply of durable and dependable sundries such as buttons, badges, punches, etc. You can feel sure that their quality today is of the same high standard as always.

Let us quote you prices

AMERICAN RAILWAY SUPPLY CO.
134-136 CHARLES STREET, NEW YORK

DIFFERENTIAL
UTILITY CARS

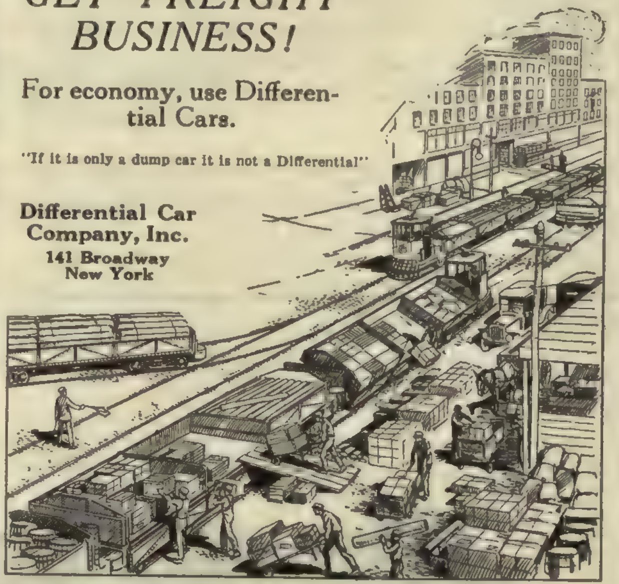
Electric Railways!

GET FREIGHT BUSINESS!

For economy, use Differential Cars.

"If it is only a dump car it is not a Differential"

Differential Car Company, Inc.
141 Broadway
New York



Cleveland Fare Boxes protect all the fares. Accommodate any rate of cash fare, any kind of ticket.

The Cleveland Fare Box Company
Cleveland, Ohio
Canadian Branch, Preston, Ontario

BUCKEYE JACKS

high-grade R. R. Track and Car Jacks.

The Buckeye Jack Mfg. Co.
Alliance, Ohio

162 RAILROADS
USE DIXIE CUP
Penny Vending Machines
To Solve their Drinking Cup Problems
in Cars and Stations
INDIVIDUAL DRINKING CUP COMPANY, INC.
HUGH MOORE, President
Original Makers of the Paper Cup — 220-230 W. 19th Street New York

***The* McGill Utility Punch**

A time saver and a labor saver. A handier, quicker working, easier-to-operate punch. Lowest priced high grade punch ever placed on the market. A punch for *every* conductor.

It fits the hand like a ball—no sharp edges or corners—a comfortable punch to handle.

Then there's the visible feature. The punched part of the transfer is seen at a glance. The slot is ⅛ inch wide, permitting 20 to 25 transfers to be punched at one time. Receptacle cap easily and quickly removed.

The McGill Utility Punch is made in 1⅛ inch reach and fractions thereof and furnished in ⅛, 3/16, and ¼ inch round dies. Substantially constructed to last. Write today for prices.

McGill Metal Products Co.
1640-42 Walnut St., Chicago

The superior service given by J-D insulators confirms the remarkable tests to which they have been subjected by engineers during the last five years. Today this pioneer thick porcelain insulator is in rapidly increasing demand throughout the world.

Your own engineering judgment and common sense agree that thick porcelain must give longer life and must protect better while in service against puncture by lightning frequencies, destruction by power arcs and cracking from any cause whatever. Your copy of "Rugged Insulators" (just out) explains why.

The redoubling of plant capacity to meet your increasing demands is nearly complete. The pioneering was done for your benefit. Are you benefiting by it?

Protect with

J-D JEFFERY-DEWITT INSULATOR CO. HUNTINGTON, W. VA.

to Greater Degree

Address—**JEFFERY-DEWITT INSULATOR CO.**

Huntington, W. Va., U. S. A.

Pioneer Manufacturers of
Thick Cementless Disc Insulators

New York
30 Church St.

Boston
176 Federal St.

Birmingham
237 Brown-Marx Bldg.

St. Paul
Pioneer Bldg.

Foreign Offices

Des Moines
Hubbell Bldg.

Seattle
526 First Ave. S.

San Francisco
183 First St.

Los Angeles
330 Azusa St.

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

ADVERTISING RATES

POSITIONS VACANT—Business Opportunities and other undisplayed ads, 8 cents a word, minimum $2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:

1 to 3 in., $4.50 an in.
4 to 7 in., $4.30 an in.
8 to 14 in., $4.10 an in.
15 to 29 in., $3.90 an in.
30 to 49 in., $3.80 an in.
50 to 99 in., $3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

ELECTRICAL engineer wanted. On large interurban road, Middle West. Must be experienced in power house operation and maintenance. Give references and salary desired. P-763, Elc. Ry. Journal, Old Colony Bldg., Chicago.

EXPERIENCED car starter and inspector for street railway. Opportunity for advancement. Enclose references. P-757, Elec. Ry. Journal.

EXPERIENCED timetable maker for short headway, multi-terminal road of an Eastern city, to act also as chief clerk of general office. In reply give personal data, education, experience in detail, references as to both character and ability and salary desired. Enclose recent photograph, if possible. P-765, Elec. Ry. Journal.

WORKING foreman wanted on small southern road running fifteen cars, city of 20,000 population. Must be first class armature winder on 506 A-2 motors. Able to handle labor; attend to general overhauling and maintenance of street railway equipment. Want reference from past and present employers. State salary wanted in answering. P-752, Eec. Ry. Jour., Real Estate Trust Bldg., Phila.

POSITIONS VACANT

EXPERIENCED traffic inspectors for Eastern City operating 100 cars. Good wages. Purchasing Agent, Trenton & Mercer County Trac. Corp., Trenton, N. J.

POSITIONS WANTED

MANAGER—Position as manager desired. Experience with large properties. Broad education; good address; capable of dealing with public and public officials, and handling laboring men. Good organizer. PW-764, Elec. Ry. Journal, Rialto Bldg., San Francisco.

MASTER mechanic desires to make change. 17 years' experience in all departments maintenance and construction, including Type M. and H. L. control; successful in handling labor; best of references furnished. PW-745, Elec. Ry. Journ., Real Estate Trust Bldg., Philadelphia.

MASTER mechanic desires to make change. 18 years' experience in maintenance and overhauling of all types of motors, trucks, contral. Can be at liberty within reasonable time. PW-766, Elec. Ry. Journal

COMPLETE POWER PLANT

FOR SALE

1—500 h.p. Westinghouse Compound Engine, Direct Connected to 550 volt Generator.

2—200 h.p. Harrisburg Engines, Belt Connected to Westinghouse Generators.

1—B & W Boiler, 2 Keeler Boilers, Water Heaters, Pumps, Piping, Switchboards and etc.

All in first class operating condition. Immediate delivery. Make us an offer.

The Lewistown & Reedsville Electric Railway Co., Lewistown, Pa.

POWER PLANT EQUIPMENT

FOR IMMEDIATE SALE

Consisting of two 350 hp. 175 r.p.m. Buckeye gas engines direct connected to two 200 kw. 625 volt DC. Compound wound railway generators with switch board, pump and other accessories. all in A. No. 1 operating other accessories. all in A-No.-1 operating

In addition to the above equipment we offer for sale 219 cells of electric storage battery Type F, 13 elements.

Inspection solicited. For further particulars write or wire us. Equipment released account of power purchased.

THE MISSOURI & KANSAS RAILWAY COMPANY
Overland Park, Kans.

RAILS

25 tons New 6 in., 72 lb., High Tee Rail.
110 tons Relay 9 in., 90 lb. Grooved Girder.
New and Relaying Rail in other Weights and sections available for immediate shipment from stock.

ZELNICKER IN ST. LOUIS

Get Bulletin 285—exceptional bargains

New—Used—Rebuilt

MACHINERY AND SUPPLIES
for construction and industrial work.

READING ENGINEERING CO., INC.
154 Nassau St., New York

Immediate Shipment

GIRDER RAIL

300 tons 7 in. girder rail, located Amityville, New York, also 1000 tons 70 lb. rail, 2000 tons 90 lb. rail. Write or wire for prices quoted.

M. K. FRANK, Pittsburgh, Pa.

5—Rotaries—300 K.W.

600 volt D.C., 25 cy: A.C. Trans. 15,000 volt, complete with Switchboards. Good condition. **1600 EACH.**

BARGAINS

Send for our used mach. list.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

FOR SALE

16 West. 56 Motors. 4 K-14 Controllers. 4 National type BB-4 Air Brake Equipments complete. 15 Double Truck Cars, 40-ft. long, mounted on Brill Trucks equipped with 4 GE-67 Motors, 2 K-6 Controllers, Air Brakes, etc., complete.

Electric Equipment Co.
Commonwealth Building, Philadelphia, Pa.

"Opportunity" Advertising:

Think
"SEARCHLIGHT"
First!

0099

Machinery in Stock for
Immediate Shipment

ROTARY CONVERTERS

1—300 kw., Westg., 3-phase, 60-cycle, 370-v., A.C., 575-v., D.C., 600 r.p.m.
2—200 kw., G.E., 3-phase, 25-cycle, 85-v., A.C., 125-v., D.C., 8 pole, 375 r.p.m.

FREQUENCY CHANGER SETS

1—600 kva., Allis-Chalmers Frequency Changer Set, 300 r.p.m., 3-phase, 60-cycle, 2300-v. one end, 3-phase, 6600-v., 25-cycle on other end.
1—400 kw., G. E., 3-phase, 25-cycle, 6000-v. one side—2400-v., 2-phase, 60-cycle other side—375 r.p.m.

ARCHER & BALDWIN, INC.
114-118 Liberty Street, New York City
Telephone 4337-4338 Rector

Some One Wants to Buy

the equipment or machinery
that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it *Before* depreciation *Scraps* it.

0178

MACGOVERN & COMPANY INC. POWER MACHINERY

114 Liberty St., New York, N. Y.

IMMEDIATE DELIVERY FROM STOCK

STREET RAILWAY MOTORS

34 Westinghouse No. 56, complete with gear cases, gears, pinions and axle bearings, gear ratio 16:66.

Further information gladly furnished upon request.

BRANCH OFFICES:
Pittsburgh, Pa.: 498 Union Arcade Bldg.
Seattle, Wash.: L. C. Smith Bldg.
Montreal, Que.: 285 Beaver Hall Hill

IMMEDIATE DELIVERY

Twenty-Five Cycle Rotary Converters

2—300-kw. 3-phase, 25-cycle, 600-volt, General Electric rotary converters, complete with transformers, primary voltage 13,200, secondary 380-volts.
1—250-kw., 3-phase, 25-cycle, 600-volt, General Electric rotary converters, complete with transformers, primary voltage 13,200, secondary 380 volts.

Street Railway Motors

20—G. E. 800's, complete with controllers.

All in Splendid Condition

JOSEPH MYERSON, 411 Atlantic Ave., Boston 9, Mass.

TRAM RAIL FOR SALE

1800 tons 9-in. Tram Rail—Lorain Section 127—493 in 60-ft. lengths, weighing 127 lb. to the yard.

ALSO

1100 tons 7-in. Tram Rail—Lorain Section 110—495 in 54-ft. and 60-ft. lengths, weighing 110 lb. to the yard.

JOB E. HEDGES, *Receiver*
NEW YORK RAILWAYS COMPANY
165 Broadway, New York City

---

700 tons new 9 in.

GIRDER RAIL

Penna Steel Co. section 228, 112 lb. to the yard. Price—$45 per gross ton, f.o.b. cars Brooklyn, N. Y. Subject to R. W. Hunt & Company's inspection. Prompt shipment.

H. M. FOSTER CO.
Continental Building, Baltimore, Md.

NEW REBUILT **ELECTRIC MOTORS** REWINDING REPAIRING

NEW A.C. MOTORS ¼ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLANT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.
EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND, O. *INC. 19*

The Searchlight Advertising in This Paper

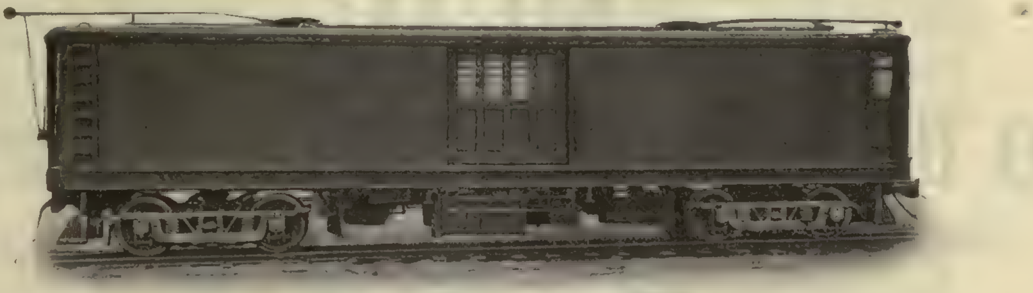
is read by men whose success depends upon thorough knowledge of means to an end—whether it be the securing of a good second-hand piece of apparatus at a moderate price, or an expert employee.

THE BEST PROOF

of this is the variety of this journal's Searchlight ads. Without a constant and appreciable *demand* for such machinery or services, by its readers, the market place which these advertisements represent could not exist for any length of time.

Are *you* using the Searchlight Section?

For Sale **Immediate Delivery**



THREE LOCOMOTIVE-EXPRESS CARS

Builder	Watson Mfg. Co.
Length over all	48 ft. 9 in.
Length inside	44 ft. 3 in.
Width inside	8 ft.

These cars are about five years old. They have very heavy steel under frames; Janey radial M C B couplers; M C B height; door in center of each side, 6 ft. high by 6 ft. wide. One of the cars has two doors on each side. Westinghouse straight and automatic air brakes; truck centers 28 ft. 8 in. These cars are in splendid condition.

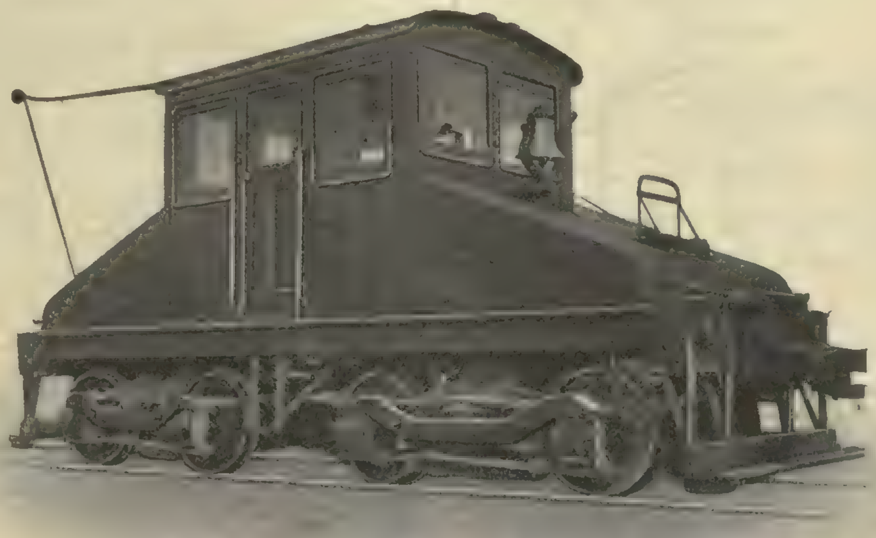
TRUCKS

Builder	Baldwin M C B
Wheel Base	6 ft. 4 in.
Diameter of Axles	6 in.
Steel Wheels	34 in. dia., 3 in. tread

ELECTRICAL EQUIPMENT

One of these cars is now fitted with four GE-205 (100 hp.) motors, the other two with four GE-217 motors. GE-73 (75 hp.) or Westinghouse 121 (55 hp.) motors could be sugstituted if desired. Type M control for double end operation.

CODE "CRAL"



ONE ALL STEEL ELECTRIC LOCOMOTIVE

Builder	Baldwin Locomotive Works
Length Over All	25 ft. 0 in.
Extreme Width	7 ft. 4 in.
Height	11 ft. 9 in.

In perfect condition ready for immediate service. Westinghouse automatic air brakes. D-2-E-G compressors. M C B spring couplers. Truck base, 12 ft. 0 in.

TRUCKS

Builder	Baldwin
Wheelbase	6 ft.
Wheels, diameter	33 in.
Tread	4 in.

ELECTRICAL EQUIPMENT

Consists of four Westinghouse No. 121 (85 hp.) motors and one L-4 Controller. Other motors could be substituted.

CODE "LONGS"

TRANSIT EQUIPMENT COMPANY, 501 Fifth Ave., New York

NEW
80 lb. RAIL & ACCESSORIES

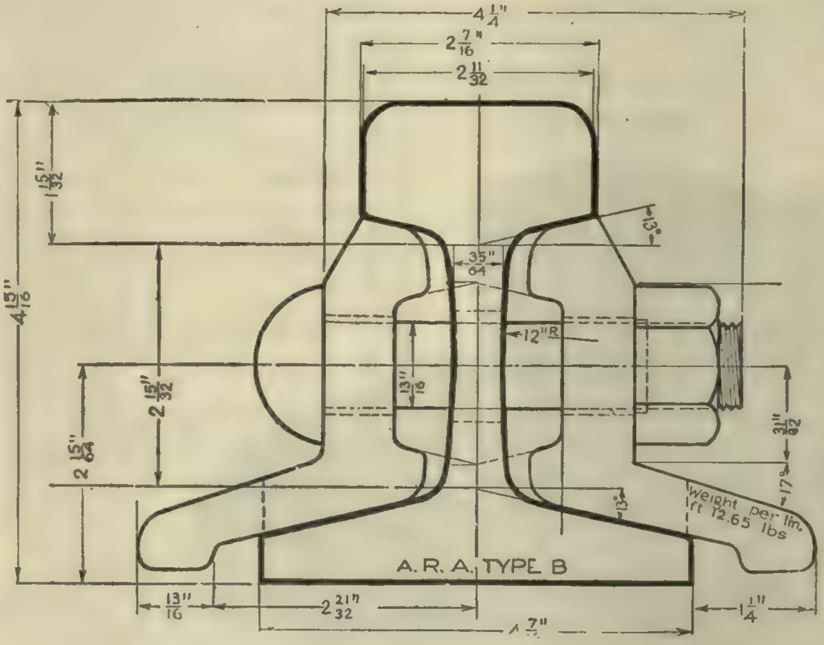
ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

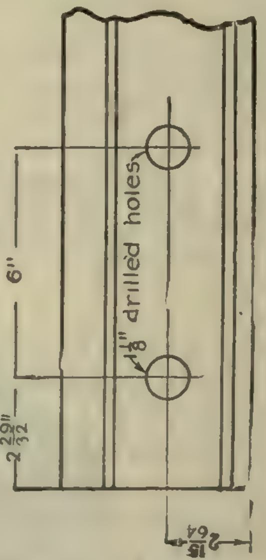
For Sale

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.





Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

NEW AND RELAYING RAILS

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

St. Louis Office
2115 Railway Exchange Building

We buy electric and steam railways that are to be dismantled

114 Liberty Street
New York, N. Y.

MACGOVERN & COMPANY INCORPORATED
POWER MACHINERY

IN STOCK FOR PROMPT SHIPMENT

RAILWAY MOTORS

34—Westinghouse No. 56 Railway Motors Complete with Gears, Pinions and Gear Cases, Gear Ratio 16:66, Armature Winding Two Turn, Axle Bearings 4-$\frac{7}{8}$ in. Diameter.

STREET RAILWAY CARS

2—Brill double truck combination passenger and baggage cars, 38 ft. long, overall, passenger compartment 19 ft. 6 in. long, baggage compartment 8 ft. 7 in. long, equipped with four No. 101-B Westinghouse motor equipments complete.

1—Brill semi-convertible, single truck passenger car, full vestibule, 12 reversible seats, 4 stationary seats, rattan upholstery, oak interior finish, length overall 32 ft., extreme width 8 ft. 5 in., 8 ft. wheel-base, Brill 21-E truck, two Westinghouse 38-E motors and K-10 controllers.

1—Work car, equipped with two No. 49 Westinghouse motors complete.

WIRE AND CABLE

27 miles of No. 4 hard drawn copper wire.
8 miles of 350,000 c.m. stranded cable, bare.
3 miles of No. 4/0 weatherproof insulated wire.
40,000 lbs. No. 4/0 grooved trolley wire.

ROTARY CONVERTERS

25 and 60 Cycles

1—1500 KW. Westinghouse, 6 phase, 60 cycle, 258 volts D.C., 178 volts A.C., 450 RPM., with speed limit device and starting panel.

1—1000 KW. Westinghouse, 6 phase, 60 cycle, 220 volts D.C., 156 volts A.C., 514 RPM., with switchboard.

1—300 KW. National, RT., 3 phase, 25 cycle, 550 volts D.C., 330 volts A.C., 500 RPM.

1—300 KW. Westinghouse, 3 phase, 60 cycle, 600 volts D.C., 350 volts A.C., 600 RPM., with three 125 KVA. Gen. Elec. single phase, transformers, 6600/5940 volts prim., 370 volts Sec., also A.C. and D.C. panels, complete with instruments.

1—300 KW. General Electric, 3 phase, 60 cycle, 600 volts D.C., 600 RPM., with starting motor and switchboard panel.

1—250 KW., Gen. Elec., TC-A, 3 phase, 25 cycle, 550 volts D.C., 350 volts A.C., 750 RPM., with switchboard equipment.

1—100 KW., Gen. Elec., TC-A, 3 phase, 60 cycle, 220 volts D.C., 340 volts A.C., 1200 RPM.

TURBO-GENERATOR UNITS

25 Cycle

1—8,000 KW. (normal rating) Allis-Chalmers Turbo Unit, 3 phase, 4 pole, 6,600 volt, rotating field, condensing, high pressure, 175 lb. gauge at throttle, 28 in vacuum. Will not exceed 18 lb. dry steam per KW. when working under full load. Condenser: 16,000 sq.ft. surface condenser with auxiliaries. Will sell with or without condenser.

1—6,000 KW. General Electric-Curtis Turbo Unit, 3 phase, 2 pole, ATB, condensing, 6,600 volts, horizontal, 1,500 RPM., 170 lbs. steam pressure, 175 deg. superheat and vacuum from 28 in. to 29 in.

1—500 KW., Westinghouse-Parsons Turbo Unit, 3 phase, 2 pole, 370/400 volt, 1,500 RPM., 150 lb. steam, 28 in. vacuum, with condenser and condenser auxiliaries.

60 Cycle

1—1,200 KW., Allis-Chalmers horizontal turbo unit, 3 phase, 240 volt, 3,600 RPM., non-condensing, 150 lbs. steam pressure, with direct-connected exciter.

1—1,250 KVA., 1,000 KW. (80% P.F.), Westinghouse-Parsons horizontal mixed pressure turbo unit, 2 pole, 2,300 volt, 3 phase, 3,600 RPM., complete with condenser and auxiliaries.

1—750 KW., General Electric-Curtis horizontal turbo-unit, (80% P.F.), 3 phase, 2,300 volts, 1,800 RPM., 5 stage, 150 lbs. steam pressure, with condenser and auxiliaries.

1—500 KW., Westinghouse-Parsons vertical turbo unit, 3 phase, 2,300 volts, 1,800 RPM., 2 stage, with condenser and auxiliaries.

1—500 KW., General Electric-Curtis horizontal turbo unit, 3 phase, 2,300 volts, 3,600 RPM., 4 stage, 175 lbs. steam pressure, with condenser and condenser auxiliaries.

1—300 KW., Westinghouse-Parsons horizontal turbo unit, 2,200 volts, 3,600 RPM., 140 lbs. steam pressure, with condenser and auxiliaries.
denser and auxiliaries.

1—300 KW., General Electric-Curtis horizontal turbo unit, 3 phase, 2,300 volts, 1,800 RPM., 4 stage, 110 lbs. steam pressure, with condenser and auxiliaries.

1—300 KW., Allis-Chalmers horizontal turbo unit, 3 phase, 4,400 volts, 3,600 RPM., 150 lbs. steam pressure, with condenser and auxiliaries.

1—250 KVA. (80% PF.) Westinghouse-Parsons horizontal turbo unit, 3 phase, 2,300 volts, 3,600 RPM., 150 lbs. steam pressure.

The above are only a few items from our large stock of Steam and Electrical Equipment, consisting of TURBO UNITS, RECIPROCATING UNITS, ROTARY CONVERTERS, MOTOR-GENERATOR SETS, BOILERS, CONDENSERS, PUMPS, ETC. Complete list will be gladly mailed upon request.
Send for our special lists of INDUCTION MOTORS, new and used, as we have too many to list here.

BRANCH OFFICES:

PITTSBURGH, PA.
438 Union Arcade Building

SEATTLE, WASH.
402 L. C. Smith Building

MONTREAL, QUE.
225 Beaver Hall Hill

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Acetylene Service and Apparatus
- Oxweld Acetylene Co.

Advertising, Street Car
- Collier, Inc., Barron G.

Air Aftercoolers
- Ingersoll-Rand Co.

Air Pressure Relays
- Electrical Development & Machine Co.

Air Receivers
- Ingersoll-Rand Co.

Ammeters
- Weston Electrical Instrument Co.

Anchors, Guy
- Electric Service Supplies Co.
- Ohio Brass Co.
- Track Specialties Co.
- Westinghouse Elec. & Mfg. Co.

Angle Bars
- Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
- Green Engineering Company

Automobiles and Buses
- Brill Co., The J. G.

Axles
- Bemis Car Truck Co.
- Cambria Steel Co.
- Midvale Steel & Ordnance Co.
- St. Louis Car Co.

Axle Straighteners
- Columbia M. W. & M. I. Co.

Axles, Car Wheel
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Carnegie Steel Co.
- Standard Steel Works Co.
- Westinghouse Elec. & Mfg. Co.

Babbitt Metal
- Ajax Metal Co.
- More-Jones Brass & Metal Co.

Babbitting Devices
- Columbia M. W. & M. I. Co.

Badges and Buttons
- American Railway Supply Co.
- Electric Service Supplies Co.
- International Register Co., The

Batteries Dry
- Johns-Manville Co., H. W.
- Western Electric Co.

Batteries, Storage
- Electric Storage Battery Co.

Bearings and Bearing Metals
- Ajax Metal Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- More-Jones Brass & Metal Co.
- St. Louis Car Co.
- Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
- Stucki Co., A.

Bells and Gongs
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- St. Louis Car Co.

Belt Fasteners, Lacing Hooks and Rivets
- Crescent Belt Fasteners Co.

Benders, Rail
- Niles-Bement Pond Co.
- Reading Specialties Co.
- Track Specialties Co.

Boilers
- Babcock & Wilcox Co.
- Boiler Cleaning Compounds

Bond Testers
- American Steel & Wire Co.
- Rail Welding & Bonding Co.

Bonding Apparatus
- American Steel & Wire Co.
- Electric Railway Improv. Co.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Oxweld Acetylene Co.
- Rail Welding & Bonding Co.

Bonds, Rail
- American Steel & Wire Co.
- Copper Clad Steel Co.
- Electric Railway Improv. Co.
- Electric Service Supplies Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Ohio Brass Co
- Rail Welding & Bonding Co.
- Westinghouse Elec. & Mfg. Co.

Book Publishers
- McGraw-Hill Book Co., Inc.

Boring Tools, Car Wheel
- Niles-Bement-Pond Co.

Bores—Junction and Outlet
- National Metal Moulding Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
- American Bridge Co.
- Bates Expanded Steel Truss Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Hubbard & Co.
- Ohio Brass Co.

Brake Adjusters
- Gould Coupler Co.
- National Ry. Appliance Co.
- Smith-Ward Brake Co.
- Westinghouse Traction Brake Co.

Brake Shoes
- Amer. Brake Shoe & Fdry. Co.
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
- Ackley Brake & Supply Corp.
- Allis-Chalmers Mfg. Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- National Brake Co.
- Safety Car Devices Co.
- St. Louis Car Co.
- Westinghouse Traction Brake Co.

Bricks, Fire
- Green Engineering Co.

Bridges & Buildings
- American Bridge Co.

Brooms, Track, Steel or Rattan
- Paxson Co., J. W.
- Western Electric Co.
- Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
- General Electric Co.
- Jeandron, W. J.
- Morganite Brush Co.
- United States Graphite Co.
- Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
- United States Graphite Co.

Brush Holders
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.

Bunkers, Coal
- American Bridge Co.

Bushings, Case Hardened and Manganese
- Bemis Car Truck Co.
- National Metal Molding Co.

Bushings, Graphite and Wooden
- Bound Brook Oilless Bearing Co.

Cable End Bells
- Electrical Development & Machine Co.

Cables. (See Wires and Cables)

Carbon Brushes. (See Brushes, Carbon

Car Heaters
- Economy Electric Devices Co.

Car Panel Safety Switches
- Westinghouse Elec. & Mfg. Co.

Cars, Dump
- Differential Car Co.

Cars, Passenger, Freight, Express, etc.
- American Car Co.
- Brill Co., The J. G.
- Cambria Steel Co.
- Kuhlman Car Co., G. C.
- McGuire-Cummings Mfg. Co.
- Midvale Steel & Ordnance Co.
- National Ry. Appliance Co.
- Osgood Bradley Car Co.
- St. Louis Car Co.
- Wason Mfg. Co.

Cars, Second Hand
- Electric Equipment Co.

Cars, Self-Propelled
- Electric Storage Battery Co.
- General Electric Co.

Castings, Brass, Composition or Copper
- Ajax Metal Co.
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
- American Bridge Co.
- American Steel Foundries
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Standard Steel Works Co.
- St. Louis Car Co.

Castings, Malleable and Brass
- Amer. Brake Shoe & Fdry Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- St. Louis Car Co.

Catchers and Retrievers, Trolley
- Ackley Brake & Supply Co.
- Earll, Chas. I.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Wood Co., Chas. N.

Ceiling, Car
- Pantasote Co.

Change Carriers
- McGill Metal Products Co.

Checks, Employees
- American Railway Supply Co.

Circuit Breakers
- Cutter Electrical & Mfg. Co., The
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Clamps, Insulator
- Electrical Development & Machine Co.

Clamps and Connectors for Wires and Cables
- Anderson Mfg. Co., A. & J. M.
- Dossert & Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Eureka Co.
- General Electric Co.
- Hubbard & Co.
- Klein & Sons, Mathias
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
- Brill Co., The J. G.
- Ohio Brass Co.

Cleats
- National Metal Molding Co.

Cleat Type Switchboard Insulators
- Electrical Development & Machine Co.

Clusters and Sockets
- General Electric Co.

Coal and Ash Handling. (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Coils, Armature and Field
- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
- Electric Service Supplies Co.
- International Register Co., The
- Johnson Fare Box Co.

Combustion Systems
- Engineer Co., The

Commutator Slotters
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
- General Electric Co.

Commutators or Parts
- Cameron Electrical Mfg. Co.
- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Mica Insulator Co.
- Westinghouse Elec. & Mfg. Co.

Compressors, Air
- Allis-Chalmers Mfg. Co.
- Chicago Pneumatic Tool Co.
- General Electric Co.
- Ingersoll-Rand Co.
- Westinghouse Trac. Brake Co.

Compressors, Gas
- Ingersoll-Rand Co.

Concrete Products
- Massey Concrete Products Corp.

Condensers
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Schutte & Koerting Co.
- Westinghouse Elec. & Mfg. Co.

Conduit Fittings
- Chicago Fuse Mfg. Co.

Conduits, Flexible
- Tubular Woven Fabric Co.

Conduits, Interior
- National Metal Molding Co.

Conduits, Underground
- Johns-Manville Co., H. W.
- Western Electric Co.

Connectors, Solderless
- Dossert & Co.
- Frankel Connector Co.
- Westinghouse Elec. & Mfg. Co.

Controller Fingers
- Russell Mfg. Co.

Controllers or Parts
- Allis-Chalmers Mfg. Co.
- Columbia M. W. & M. I. Co.
- Eureka Co.
- General Electric Co.
- Johns-Manville Co., H. W.
- Russell Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

Controller Regulators
- Elec. Service Supplies Co.

Controlling Systems
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Converters, Rotary
- Allis-Chalmers Mfg. Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
- Portable Machinery Co.

Conveyors, Coal and Ash
- Green Eng. Co.
- Portable Machinery Co.

Conveyors, Portable
- Portable Machinery Co.

Conveying and Hoisting Machinery
- American Bridge Co.
- Columbia M. W. & M. I. Co.
- Green Eng. Co.
- Portable Machinery Co.

Cooling Systems
- Spray Engineering Co.

Copper Wire
- Anaconda Copper Mining Co.
- Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
- Brill Co., The J. G.
- Electric Service Supplies Co.
- International Register Co., The
- Roebling's Sons Co., John A.
- Samson Cordage Works

Cord Connectors and Couplers
- Electric Service Supplies Co.
- Samson Cordage Works
- Wood Co., Chas. N.

Couplers, Car
- Brill Co., The J. G.
- Gould Coupler Co.
- Ohio Brass Co.
- Van Dorn Coupler Co.
- Westinghouse Trac. Brake Co.

Cranes
- Niles-Bement-Pond Co.
- Toledo Bridge & Crane Co., The

Cross Arms. (See Brackets)

Crossing Foundations
- International Steel Tie Co.

Crossing Signals. (See Signals, Crossing)

Crossings, Frog & Switch
- Wharton, Jr., & Co., Wm.

Crossings, Track. (See Track, Special Work)

Crushers, Lock
- Allis-Chalmers Mfg. Co.

Culvert Pipe, Concrete
- Massey Concrete Products Corp.

Culverts
- Canton Culvert & Silo Co.

Curtains and Curtain Fixtures
- Brill Co., The J. G.
- Electric Service Supplies Co.
- Pantasote Co.
- St. Louis Car Co.

Cutouts
- Chicago Fuse Mfg. Co.

Cutting Apparatus, Oxy-Acetylene
- Oxweld Acetylene Co.

Dealers' Machinery
- Archer & Baldwin
- Electric Equipment Co.
- Foster Co., L. B.
- Hyman Michaels Co.

Derailing Devices. (See also Track Work)
- Cleveland Frog & Crossing Co.
- Wharton, Jr. & Co., Wm.

Destination Signs
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Detective Service
- Wish Service, P. Edward

Disconnecting Switches
- Electrical Development & Machine Co.

Dogs, Lathe
- Williams & Co., J. H.

Door Operating Devices
- Consolidated Car Heating Co.
- National Pneumatic Co., Inc.
- Safety Car Devices Co.

Doors and Door Fixtures
- Brill Co., The J. G.
- General Electric Co.

Doors, Folding Vestibule
- National Pneumatic Co., Inc.

Doors for Bus & Switch Compartment
- Electrical Development & Machine Co.

Draft Rigging. (See Couplers)

Drills, Rock
- Ingersoll-Rand Co.

Drills, Track
- American Steel & Wire Co.
- Chicago Pneumatic Tool Co.
- Electric Service Supplies Co.
- Niles-Bement-Pond Co.
- Ohio Brass Co.

Drinking Cups, Sanitary Paper
- Individual Drinking Cup Co., Inc.

Dryers, Sand
- Electric Service Supplies Co
- Zelnicker Supply Co., Inc., Walter A.

Electrical Wires and Cables
- Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating
- Allison & Co., J. S.
- Archbold-Brady Co.
- Arnold Co., The
- Clark Management Corp., E. W.
- Drum & Co., A. L.
- Engel & Hevenor
- Feustel, Robert M.
- Ford, Bacon & Davis
- Hemphill & Wells

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- Holst, Englehardt W.
- Jackson, Walter.
- Jacobs & Co., J. L.
- Jurney, Oscar A.
- Republic Engineers, Inc.
- Richey, Albert S.
- Sanderson & Porter
- Scofield Engineering Co.
- Stone & Webster
- White Engineering Corp., The J.G.
- **Engines, Gas, Oil or Steam**
  - Allis-Chalmers Mfg. Co.
  - Ingersoll-Rand Co.
  - Westinghouse Elec. & Mfg. Co.
- **Engines, Steam**
  - Allis-Chalmers Mfg. Co.
- **Fare Boxes**
  - Brill Co., The J. G.
  - Cleveland Fare Box Co.
  - Economy Electric Devices Co.
  - Johnson Fare Box Co.
  - National Railway Appliance Co.
  - Ohmer Fare Register Co.
- **Feed Water Heaters**
  - Schutte & Koerting Co.
- **Fences, Woven Wire and Fence Posts**
  - American Steel & Wire Co.
- **Fenders and Wheel Guards**
  - Brill Co., The J. G.
  - Cleveland Fare Box Co.
  - Consolidated Car Fender Co.
  - Electric Service Supplies Co.
  - Star Brass Works
- **Fibre and Fibre Tubing**
  - Continental Fibre Co.
  - Johns-Manville Co., H. W.
  - Westinghouse Elec. & Mfg. Co.
- **Field Coils. (See Coils)**
- **Filters, Water**
  - Scaife & Sons Co., Wm. B.
- **Fire Extinguishing Apparatus**
  - Castle, Inc., James M
  - Johns-Manville Co., H. W.
- **Flaxlinum Insulation**
  - National Railway Appliance Co.
- **Floodlights**
  - Electric Service Supplies Co.
- **Flooring Composition**
  - American Mason Safety Tread Co
- **Flooring, Grating**
  - Irving Iron Works
- **Forgings**
  - Carnegie Steel Co.
  - Columbia M. W. & M. I. Co.
  - Eureka Co.
  - Standard Steel Works Co.
  - Williams & Co., J. H.
- **Frogs, Track. (See Track Work)**
- **Funnel Castings**
  - Wharton, Jr., Inc., & Co., Wm.
- **Fuses and Fuse Boxes**
  - Chicago Fuse Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
  - Johns-Manville Co., H. W.
  - Westinghouse Elec. & Mfg. Co.
  - Williams & Co., J. H.
- **Fuses, Refillable**
  - Chicago Fuse Mfg. Co.
  - Columbia M. W. & M. I. Co.
  - General Electric Co.
- **Gages, Oil and Water**
  - Ohio Brass Co.
- **Gaskets**
  - Power Specialty Co.
  - Westinghouse Traction Brake Co.
- **Gas-Electric Cars**
  - General Electric Co.
- **Gas Producers**
  - Westinghouse Elec. & Mfg. Co.
- **Gates, Car**
  - Brill Co., The J. G.
- **Gear Blanks**
  - Carnegie Steel Co.
  - Standard Steel Works Co.
- **Gear Cases**
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
  - Westinghouse Elec. & Mfg. Co.
- **Gears and Pinions**
  - Ackley Brake & Supply Corp.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
  - General Electric Co.
  - National Railway Appliance Co.
  - Nuttall Co., R. D.
  - Tool Steel Gear & Pinion Co.
- **Generating Sets, Gas-Electric**
  - General Electric Co.
- **Generators**
  - Allis-Chalmers Mfg. Co.
  - General Electric Co
  - Westinghouse Elec. & Mfg. Co.
- **Gongs. (See Bells and Gongs)**
- **Graphite**
  - Morganite Brush Co.
- **Grates, Chain**
  - Green Eng. Co.
- **Greases. (See Lubricants)**
- **Grinders and Grinding Supplies**
  - Indianapolis Switch & Frog Co.
  - Metal & Thermit Corp.
  - Railway Track-work Co.
- **Grinding Blocks and Wheels**
  - Railway Track-work Co.
- **Grounding Boxes**
  - Electrical Development & Machine Co.
- **Guards, Cattle**
  - American Bridge Co.
- **Guards, Trolley**
  - Electric Service Supplies Co.
  - Ohio Brass Co.
- **Harps, Trolley**
  - Anderson Mfg. Co., A. & J. M.
  - Bayonet Trolley Harp Co.
  - Electric Service Supplies Co.
  - Hensley Trolley & Mfg. Co.
  - More-Jones B. & M. Co.
  - Nuttall Co., R. D.
  - Star Brass Works
- **Headlights**
  - Electric Service Supplies Co.
  - General Electric Co.
  - Ohio Brass Co.
  - St Louis Car Co.
- **Headlining**
  - Pantasote Co.
- **Heaters, Car (Electric)**
  - Consolidated Car Heating Co.
  - Gold Car Heating & Lighting Co.
  - National Ry. Appliance Co.
  - Smith Heater Co., Peter
- **Heaters, Car, Hot Air and Water**
  - Cooper Heater Co.
  - Smith Heater Co., Peter
- **Heaters, Car (Stove)**
  - Electric Service Supplies Co.
  - Smith Heater Co., Peter
- **Hoists and Lifts**
  - Columbia M. W. & M. I. Co.
  - Ford-Chain Block Co.
  - Niles-Bement-Pond Co.
  - Toledo Bridge & Crane Co., The
- **Hose**
  - Ingersoll-Rand Co.
- **Hose, Bridges**
  - Ohio Brass Co.
- **Houses, Watchman**
  - Massey Concrete Products Corp.
- **Hydraulic Machinery**
  - Niles-Bement-Pond Co.
- **Injectors**
  - Schutte & Koerting Co.
- **Inspection**
  - Electrical Testing Lab's
- **Institutions, Educational**
  - Alexander Hamilton Institute
- **Instrument Cutout Switches**
  - Electrical Development & Machine Co.
- **Instruments, Measuring, Testing and Recording**
  - Economy Elcetric Devices Co.
  - General Electric Co.
  - Thompson-Levering Co.
  - Westinghouse Elec. & Mfg. Co.
  - Weston Elec. Instrument Co.
- **Insulating Cloth, Paper and Tape**
  - General Electric Co
  - Johns-Manville Co., H. W.
  - Mica Insulator Co.
  - Okonite Co.
  - Sherwin-Williams Co.
  - Standard Underground Cable Co.
  - Westinghouse Elec & Mfg Co
- **Insulating Material, China and Porcelain**
  - Jeffrey-Dewitt Co.
- **Insulation. (See also Paints)**
  - Anderson M Co., A. & J. M.
  - Dolph Co., J. C.
  - Electric Ry. Equipment Co.
  - Electric Service Supplies Co.
  - General Electric Co.
  - Johns-Manville Co., H. W.
  - Mitchell-Rand Mfg. Co.
  - Okonite Co.
  - Westinghouse Elec & Mfg Co
- **Insulators, Cina Porcelain and Composition**
  - Jeffrey-Dewitt Co.
- **Insulators. (See also Line Material)**
  - Anderson M. Co., A. & J. M.
  - Drew Electric & Mfg. Co.
  - Electric Railway Equipment Co.
  - Electric Service Supplies Co.
  - General Electric Co.
  - Hemingray Glass Co.
  - Johns-Manville Co., H. W.
  - Ohio Brass Co.
  - Thomas & Sons Co., R.
  - Westinghouse Elec. & Mfg. Co.
- **Insulator Pins**
  - Electric Service Supplies Co.
  - Hubbard & Co.
- **Jacks. (See also Cranes, Hoists and Lifts)**
  - Brill Co., The J. G.
  - Buckeye Jack Mfg. Co.
  - Buda Co., The
  - Columbia M. W. & M. I. Co.
- **Joints, Rail**
  - Carnegie Steel Co.
  - Reading Specialties Co.
  - Track Specialties Co.
  - Zelnicker Supply Company, Inc., Walter A.
- **Journal Boxes**
  - Bemis Car Truck Co.
  - Brill Co., J. G.
  - Franklin Mfg. Co.
- **Junction Boxes**
  - Standard Underground Cable Co.
- **Lamp Guards and Fixtures**
  - Anderson M. Co., A. & J. M.
  - Electric Service Supplies Co.
  - General Electric Co.
  - National Electric Specialty Co.
  - Westinghouse Elec. & Mfg. Co
- **Lamps, Arc and Incandescent. (See also Headlights)**
  - Anderson M. Co., A. & J. M.
  - General Electric Co.
  - Westinghouse Elec. & Mfg. Co.
- **Lamps, Signal and Marker**
  - Ohio Brass Co.
- **Lathe Attachments**
  - Williams & Co., J. H.
- **Lathes, Car Wheel**
  - Niles-Bement-Pond Co.
- **Lightning Protection**
  - Anderson M. Co., A. & J. M.
  - Electric Service Supplies Co.
  - General Electric Co.
  - Ohio Brass Co.
  - Westinghouse Elec. & Mfg. Co.
- **Line Material. (See also Brackets, Insulators, Wires, etc.)**
  - Anderson M. Co., A. & J. M.
  - Archbold-Brady Co.
  - Columbia M. W. & M. I. Co.
  - Dossert & Co.
  - Drew Electric & Mfg. Co.
  - Electric Railway Equipment Co
  - Electric Service Supplies Co.
  - Eureka Co.
  - General Electric Co.
  - Hubbard & Co
  - Johns-Manville Co., H. W.
  - Ohio Brass Co.
  - Westinghouse Elec. & Mfg. Co.
- **Loaders, Wagon, Truck or Car**
  - Portable Machinery Co.
- **Locking Spring Boxes**
  - Wharton, Jr., & Co., Wm.
- **Locomotives, Electric**
  - Brill Co., The J. G.
  - General Electric Co.
  - McGuire-Cummings Mfg. Co.
  - Westinghouse Elec. & Mfg. Co.
- **Lubricating Engineers**
  - Galena-Signal Oil Co.
  - Texas Co.
  - Universal Lubricating Co.
- **Lubricants, Oil and Grease**
  - Galena-Signal Oil Co.
  - Texas Co.
  - Universal Lubricating Co.
- **Machine Tools**
  - Columbia M. W. & M. I. Co.
  - Lynd-Farquhar Co.
  - Niles-Bement-Pond Co.
- **Machine Work**
  - Columbia M. W. & M. I. Co.
- **Machinery, Insulating**
  - American Insulating Machine Co.
- **Manganese Steel Castings**
  - Wharton, Jr., & Co., Wm.
- **Manganese Steel Special Track Work**
  - Wharton, Jr., & Co., Wm.
- **Meters, Car, Watt-Hour**
  - Economy Electric Devices Co.
- **Meters (See Instruments)**
  - Electric Service Supplies Co.
- **Mica**
  - Mica Insulator Co.
- **Mirrors for Motormen**
  - Drew Elec. & Mfg. Co.
- **Motor Leads**
  - Dossert & Co.
- **Motormen's Seats**
  - Electric Service Supplies Co.
  - Wood Co., Chas. N.
- **Motors, Electric**
  - Allis-Chalmers Mfg. Co.
  - Westinghouse Elec. & Mfg. Co.
- **Motors and Generators, Sets**
  - General Electric Co.
- **Molding, Metal**
  - National Metal Molding Co.
- **Nuts and Bolts**
  - Barbour-Stockwell Co.
  - Bemis Car Truck Co.
  - Columbia M. W. & M. I. Co.
  - Hubbard & Co.
- **Ohmmeters**
  - Weston Elec'l Instrument Co.
- **Oils. (See Lubricants)**
- **Oil Burning Equipment**
  - Schutte & Koerting Co.
- **Oxy-Acetylene (See Cutting Apparatus Oxy.)**
- **Packing**
  - Franklin Mfg. Co.
  - Westinghouse Elec. & Mfg. Co.
- **Paints & Varnishes (Preservative)**
  - Ackley Brake & Supply Co.
  - Sherwin-Williams Co.
- **Paints and Varnishes (Insulating)**
  - Dolph Co., John C.
  - Johns-Manville Co., H. W.
  - Mitchell-Rand Mfg. Co.
  - Sherwin-Williams Co.
- **Paints and Varnishes for Woodwork**
  - National Ry. Appliance Co.
  - Sherwin-Williams Co.
- **Paving Material**
  - American Brake Shoe & Fdry. Co.
- **Pickups, Trolley Wire**
  - Electric Service Supplies Co.
  - Ohio Brass Co.
- **Pinion Pullers**
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
  - General Electric Co.
  - Wood Co., Chas. N.
- **Pinions. (See Gears)**
- **Pins, Case Hardened, Wood and Iron**
  - Bemis Car Truck Co.
  - Electric Service Supplies Co.
  - Ohio Brass Co.
  - Westinghouse Traction Brake Co.
- **Pipe Fittings**
  - Power Specialty Co.
  - Standard Steel Works Co.
  - Westinghouse Traction Brake Co.
- **Planers. (See Machine Tools)**
- **Pliers, Insulated**
  - Electric Service Supplies Co.
- **Plugs**
  - National Metal Molding Co.
- **Pneumatic Tools**
  - Ingersoll-Rand Co.
- **Pole Reinforcing**
  - Hubbard & Co.
- **Poles, Metal Street**
  - Bates Expanded Steel Truss Co.
  - Electric Railway Equipment Co.
  - Hubbard & Co.
- **Pole Sleeves**
  - Drew Elec. & Mfg. Co.
- **Poles, Posts and Piling (Concrete)**
  - Massey Concrete Products Corp.
  - Page & Hill Co.
  - Southern Cypress Mfg. Assn.
- **Poles, Trolley**
  - Anderson Mfg. Co., A. & J. M.
  - Bayonet Trolley Harp Co.
  - Columbia M. W. & M. I. Co.
  - Electric Service Supplies Co.
  - Nuttall Co., R. D.
- **Poles, Tubular Steel**
  - Electric Railway Equipment Co.
- **Poles & Ties, Treated**
  - Page & Hill Co.
- **Porcelain Bushings**
  - Electrical Development & Machine Co.
- **Portable Grinders**
  - Buda Co.
- **Post Type Indicators**
  - Electrical Development & Machine Co.
- **Potheads**
  - Electrical Development & Machine Co.
  - Okonite Co.
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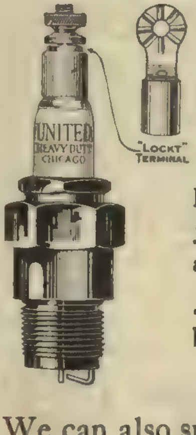

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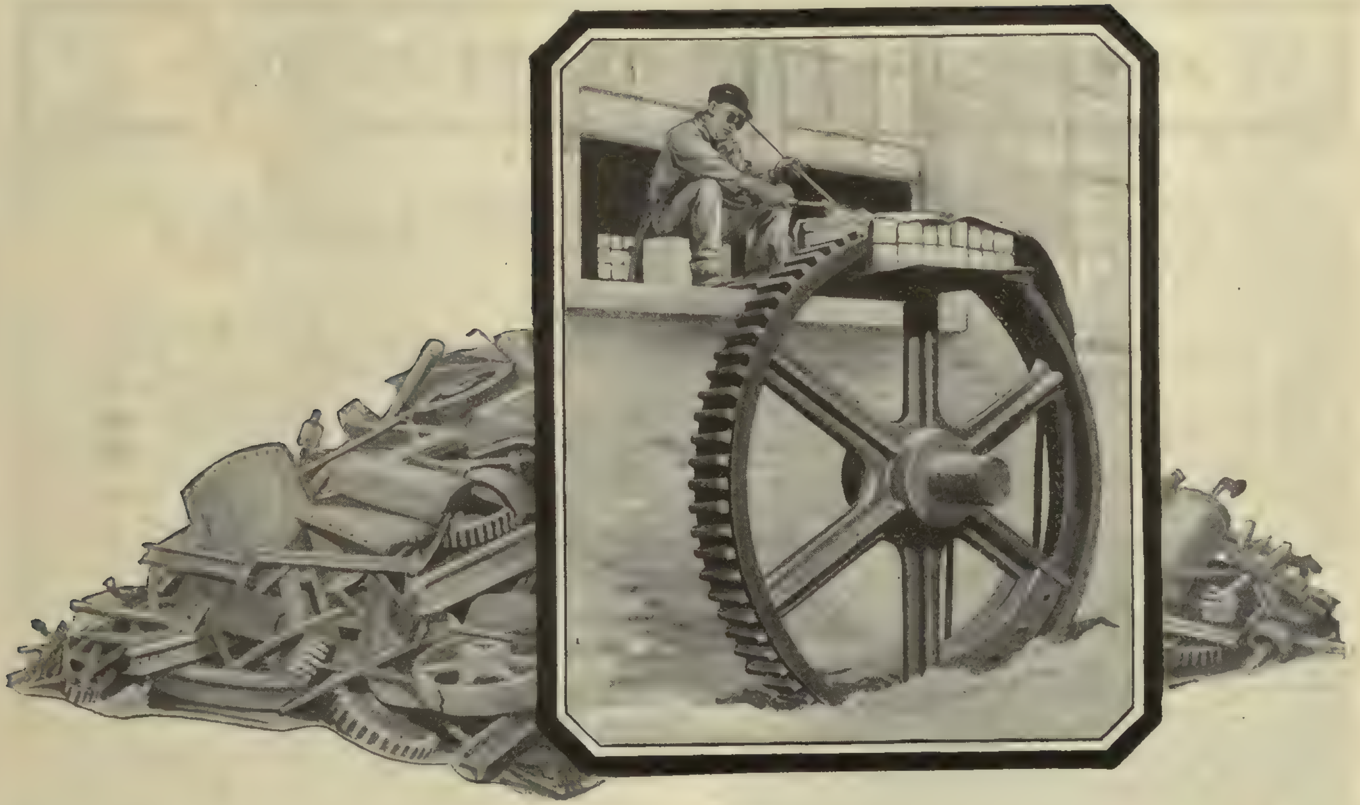

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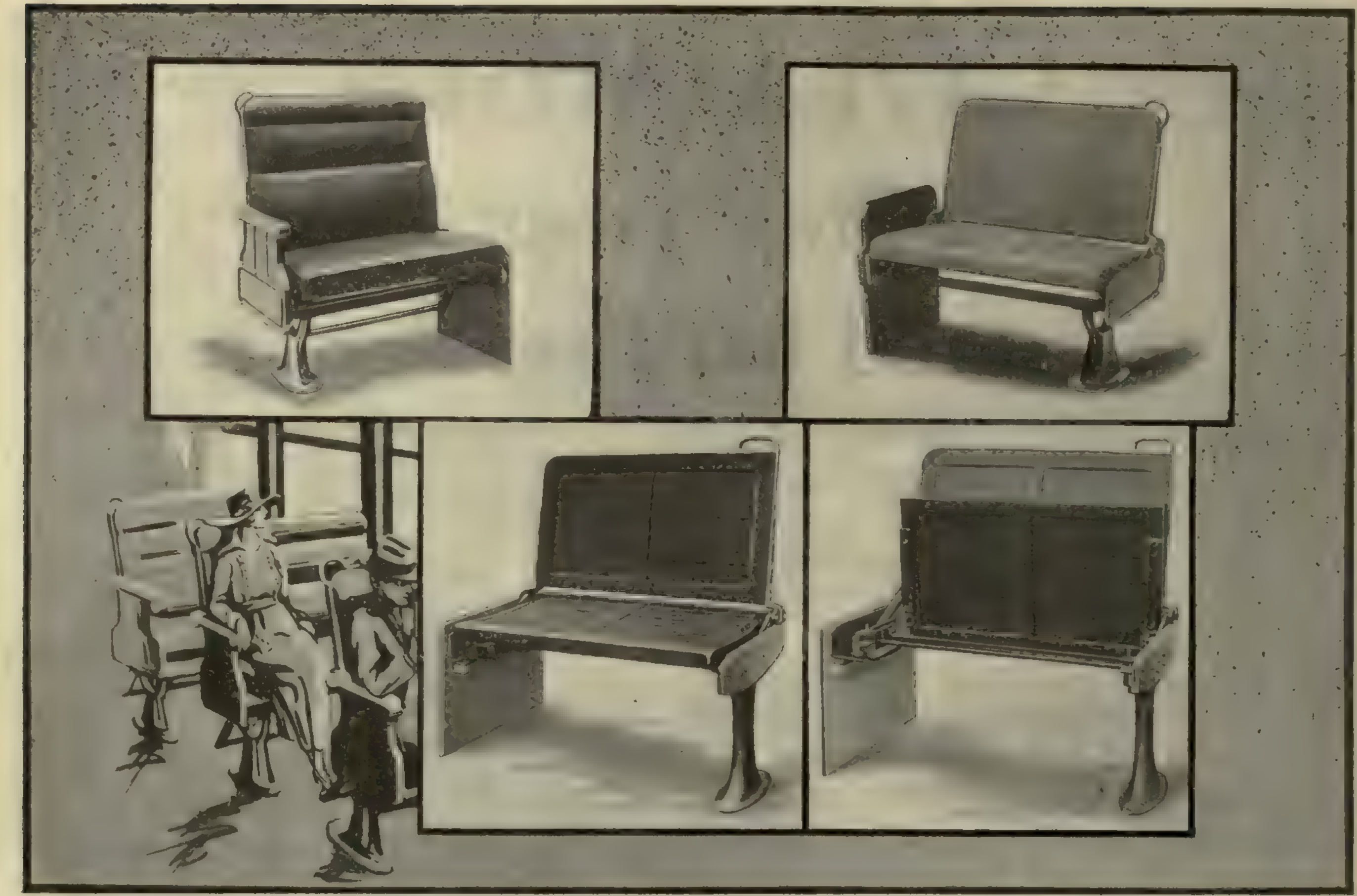
- Armature and axle straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil taping machines for armature heads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resisters
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels



Brill "Winner" Seat for interurban cars
(At Top)

Brill "Winner" Seat for city cars
(At Top)

Brill "Waylo" Seat for Safety Cars
(At Bottom)

BRILL SEAT EXHIBIT

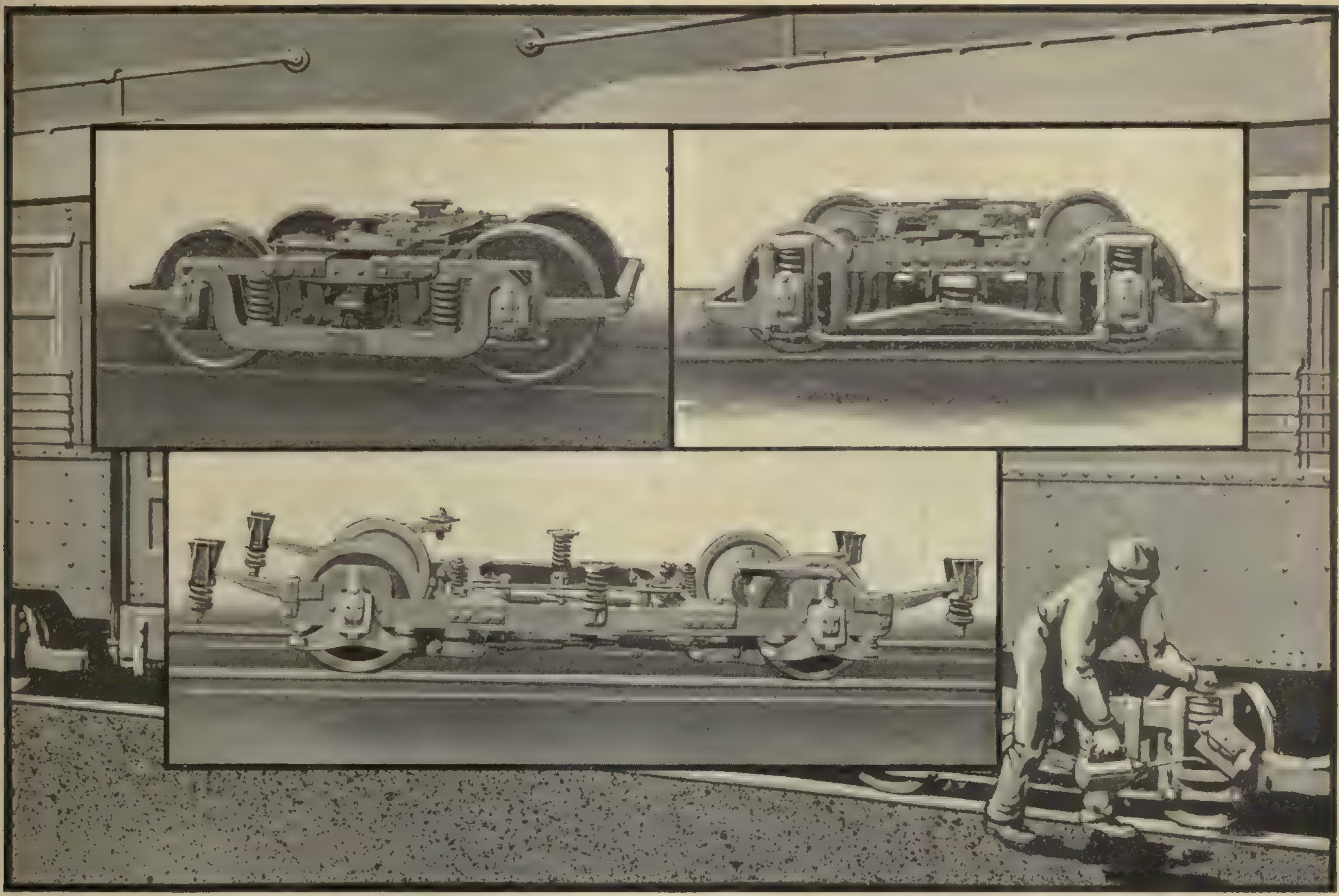
A. E. R. A. Convention

Particular attention is invited to the handsome leather-upholstered "Winner" Reversible-back Interurban Seat exhibited at the Convention.

It is constructed with pressed-steel pedestal, pressed-steel wall and aisle plates and with either stationary or adjustable foot rest.

Let us send you a copy of Brill Bulletin No. 246 which will give you the details of these three seats and other types which we manufacture.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.



Brill No. 27-MCB Truck **Brill No. 77-E Truck**
Brill No. 79-E Truck

Three Brill Trucks
Exhibited at Convention

A part of the Brill Exhibit which contributed much to its success was the display of the three trucks illustrated—the No. 27-MCB-1 for high-speed interurban service, No. 77-E-1 with 24-in. wheels for low-level cars, and No. 79-E-1 standard for Birney Safety Cars.

Each of these trucks is constructed with Solid-forged Sideframes which not only indicate strength but also insure squareness of the truck frames and improved riding qualities.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.

100% Safety Car Operation

Terre Haute, Indiana

Note the short, evenly spaced headways provided in Terre Haute by 100% Safety Car operation.

66 cars equipped with G-E-258 motors — CP-25 compressors.

25-74

General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

McGraw-Hill Company, Inc. October 9, 1920 Twenty Cents Per Copy

ELECTRIC RAILWAY JOURNAL

Saves Power
ON MORE THAN 50 ROADS
METER THE ENERGY
THATS WHAT YOU WANT TO SAVE
ECONOMY ELECTRIC DEVICES Co
CHICAGO
The ECONOMY METER
AN ELECTRIC RAILWAY EFFICIENCY DEVICE

Basic Principles of the:—

American Electric Railway Association

AMERICAN public demands efficient and adequate transportation.

ELECTRIC propulsion is the most satisfactory and most economical method.

RAILWAY transportation is a fundamental necessity and is essential for the development and growth of our country.

ASSOCIATION of all railway men is necessary for the mutual benefit of the industry and the public.

W
WESTINGHOUSE
ELECTRIC

Co-operation with the American Electric Railway Association to the fullest extent is the Westinghouse aim in the manufacture of equipment and in the rendering of service.

All Westinghouse standard motors conform in detail to A. E. R. A. standards, and their design includes every improvement developed by the industry. The welfare of the Electric Railway industry is the foremost consideration in every Westinghouse development.

Call at the Westinghouse Exhibit during the 1920 Convention and inspect these motors and many other equipment parts for use on all classes of electric railway lines.

WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY
East Pittsburgh, Pa.

Westinghouse

Vol. 56, *No.* 15 New York, October 9, 1920 *Pages* 699-744

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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Published weekly. Entered as second-class matter, June 23, 1908, at the Post Office, at New York, under the Act of March 3, 1879.

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Circulation of this issue, 6,425 copies

Advertising Indexes—Alphabetical, 46; Classified, 40, 42, 44; Searchlight Section, 35-39

Two of the new 250 Safety Cars recently purchased by the Eastern Massachusetts (Bay State) Street Ry., all of which carry "Bungalow" air compressors.

"Bungalow" Type Air Compressor

250 "Bungalow" air compressors selected by Largest Electric Railway Line

All the largest orders for Safety Cars include the "Bungalow" air compressor —Brooklyn, 200; Eastern Massachusetts, 250; Public Service Corpoation of New Jersey, 200. The highly satisfactory service rendered by this dependable machine resulted in its selection.

Its light weight, low build, compact and rugged form—and above all, its absolute dependability, recommends the "Bungalow" to exacting electric railway service.

Not only the large systems select the "Bungalow," but many smaller ones as well. The "Bungalow" is installed on 3306 Safety Cars operating on 185 different electric railways in the United States.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

New York
San Francisco

Washington

Chicago
St. Louis

The Public Utilities Commission of the State of Rhode Island Decides:

that "there has been a marked development in the application of automatic safety devices for one man car operation since the previous decision of the Commission."

In order to provide better service and cut operating costs the Newport and Providence Railway Company petitioned the State Commission for permission to use safety cars. Several years before this commission had dismissed a like petition because of the inefficiency of safety devices.

Modern safety devices won this petition for the trolley company. Hold fast to these specifications.

It Is a Genuine Safety Car Only When

it is equipped with automatic laborless apparatus, so interlocked, that regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the airbrakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

SAFETY CAR DEVICES COMPANY

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO	WASHINGTON, D. C.	NEW YORK	PITTSBURGH	SAN FRANCISCO
Railway Exchange Bldg.	Munsey Bldg.	City Investment Bldg.	Westinghouse Bldg.	Southern Pacific Bldg.

CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.

Phono-Electric

Trolley Wire Keeps The Overhead Line Intact on Tampa's Important Streets

Tampa cars run from 15-ton open-benchers of the past down to the little safety car of less than half that weight.

Most of them foregather on Franklin Street, the liveliest part of a lively city.

That's the place, of course, where the Tampa Electric Company put up No. 00 Phono-Electric Trolley Wire a couple of years ago—just as it did on many curves.

And the proved toughness and durability of Phono-Electric Trolley Wire will keep these critical parts of the system free from overhead breakdown and replacements for many years to come.

Bridgeport Brass Company
Bridgeport Connecticut

Rising Prices Have Hit Coal Harder Than Copper

Good Bonding Saves Coal

While the cost of coal has hit the sky, copper and rail bonds have advanced but slightly. Every poorly bonded joint adds its extra charge to your power cost. Extra money, enough for good bonding, is going to the coal man or the central station.

Poor bonding causes low voltage. Low voltage causes burnt-out armatures. Burnt-out armatures keep cars in the barn and high priced workmen busy.

Labor is every bit as cheap on the track as in the shop. And it is fully as easy to hire men for bonding as to find armature winders.

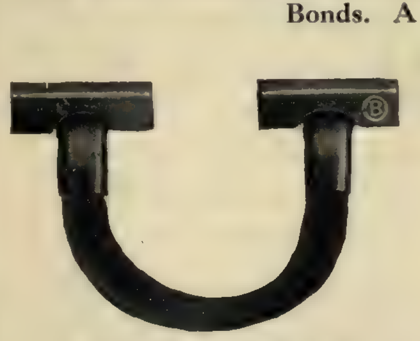
"The Return Circuit" and *"The Truth About Rail Bonding"* are interesting and enlightening. Shall we send them?

THE OHIO BRASS COMPANY, Mansfield, Ohio

Manufactures: Trolley Materials, Rail Bonds, High Tension Insulators, Third Rail Insulators.

New York, Philadelphia, Chicago, Pittsburgh, Los Angeles, San Francisco, Paris, France

"You Are Paying More for Poor Bonding than Good Bonding Costs." O-B Bonds Are Good Bonds. A few representative types are shown here.



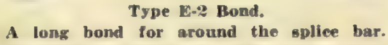
Type AW-3 Bond for Ball of Rail. Also made for Base of Rail.

O-B Arc Weld Bonds have four fundamental features which simplify installation and make a better weld possible.

Type ST-2 Bond.

O-B Gas Weld Bonds were pioneers. They still stand first.

Type F-3 Bond.
Concealed Type of Bond, installed under splice bar.



Type E-2 Bond.
A long bond for around the splice bar. Especially valuable on joints where rail movement is considerable.

O-B Stud Terminal Bonds are made in all lengths and capacities with either compressed or pin driven terminals.

In Philadelphia

"A Stitch in Time Saves Nine"

and the Ultimate Result is

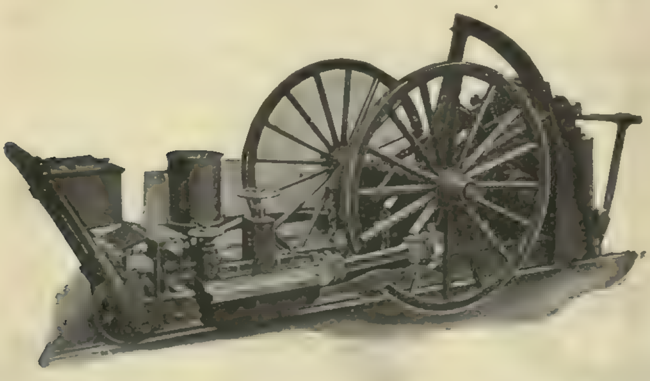
Repeat Orders, the Best Proof of Satisfaction

Twelve years ago our entire time and effort was being concentrated on grinding tracks for others.

At the present time our entire time and effort is being concentrated on attempting to get out repeat orders for the many large electric railways which have found the Railway Track-Work Company's grinders indispensable for properly maintaining their track.

Reciprocating Track Grinders

have proven so satisfactory in England that repeat orders for four machines already have been received. Its use has gradually spread to the four corners of the earth and wherever the amount of trackage has warranted it, repeat orders have been received. Its performance gives positive satisfaction under all conditions.



With the Reciprocating Track Grinder rails can be ground rapidly and accurately by untrained, ordinary workmen to a degree of smoothness which is equal to that of newly laid track. No minute adjustments are necessary.

RAILWAY TRACK-WORK CO.

3132-48 East Thompson St., Philadelphia, Pa.

EXCLUSIVE AGENTS:

ATLAS RAILWAY SUPPLY CO.
Chicago, Ill

ELECTRICAL ENGINEERING & MANUFACTURING CO.
Pittsburgh, Pa.

CHAS. N. WOOD CO.
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc
77A Queen Victoria St., E. C.
London, England

63% for Bearing and 37% for Reinforcement

IN Steel Twin Ties the economical distribution of Steel under the work a tie is called on to do takes these percentages.

The larger proportion of the Steel goes into the Three-Foot by Thirteen-Inch Bearing Plates, which are Five-sixteenths Inch thick. Flanged sides provide for stresses in the plates and in combination with the Three-Foot-Long Bearing utilize all the Steel in them.

The smaller, but equally important, proportion goes into the Three-Inch Channels, which weigh Four Pounds to the foot.

They space the rail so accurately that no gauge is needed in laying Steel Twin Ties.

They also reinforce the track foundation at Three-Foot Intervals.

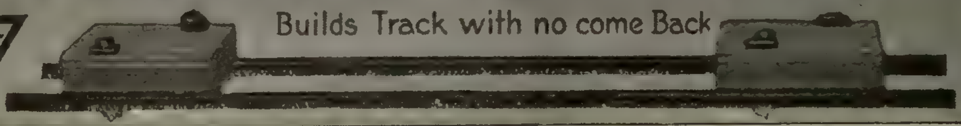
This efficient distribution of Steel is the fundamental principle of permanent, proved construction at less first cost than wood tie probabilities.

The International Steel Tie Company
Manufacturers of Steel Twin Ties and Crossing Foundations
16702 Waterloo Road CLEVELAND, O.

Steel Twin Tie Track

The RESILIENT RAILWAY TIE

Builds Track with no come Back



In the construction of new road-bed, an important factor to be considered is

Resiliency

A resilient road-bed is not only less noisy and more easy riding, but lessens wear and tear on equipment.

Dayton mechanical ties afford this resiliency so important in modern track construction. A cushion of asphalt is the shock absorbing medium. Result—Resiliency.

Build your track with no comeback.

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

These Keystone Specialties are Standard Equipment on nearly all Safety Cars.

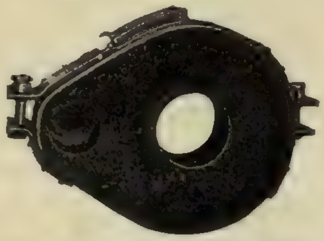
Golden Glow Headlights

Keystone Rotary Gongs

Keystone Air Sanders

Keystone Trolley Catchers

Faraday Car Signal Systems



Keystone Steel Gear Cases

Keystone-Hunter Destination Signs

Always specify them for they will serve you well. Write for Bulletin No. 167, showing many other Keystone specialties for use on safety cars.

Keystone-Hunter Illuminated Signs

When you put Keystone or Hunter Illuminated Car Signs on your cars you will do more than label them—a bright illuminated sign is an inducement to ride, it is excellent advertising. For example, how many thousands of times have men said, *"There comes our car, let's ride,"* after having seen the illuminated sign a block away.

Order signs now for your cars. They are standard equipment on safety cars and thousands of other cars.

Write for data sheets.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEWYORK
50 Church Street

CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

CHAPTER TWENTY-TWO

THE ALL-*BUT* PERFECT STATE

—and the City Shall Operate a FAIR Box

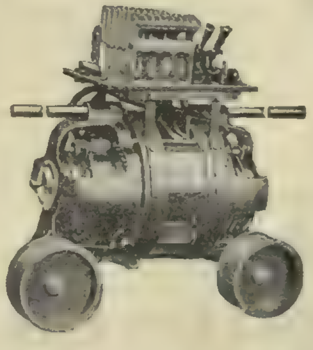
In the All-But Perfect State there will be taxes for all the people all the time—not as on earth where part of the people are taxed all the time.

Witness the electric roads paying stoutly for a street right of way and all the rest go free.

Every man must have a show with every other man.

The trolley and the jitney will travel together, each bearing its fair share—but the jitney shall be dignified by the name of omnibus and sanctioned—even operated by the railway.

The Dynamotor will keep rails in shape and the collections from the busses will keep the street in shape.



READING NUMBER TWENTY-TWO

Q. Will the Dynamotor be on display at the Atlantic City Convention?

A. By all means, and exhibits of its work in bonding and welding rails—also of shop repairs.

Rail Welding and Bonding Company

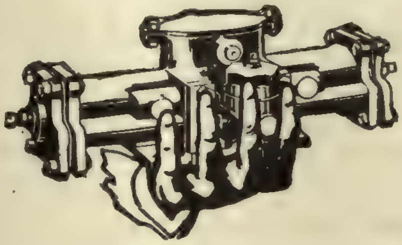
Formerly The Lincoln Bonding Co.

RW&B

Cleveland, Ohio.

NATIONAL PNEUMATIC

Standardize! *Pneumatize!*



To Get This Speed

The very instant you hear the click of the closing door, you *feel* that the car is on its way.

The conductor doesn't stop his collection of fare to tug at door levers and to pull at bell cords; nor does the motorman's brain require the hundredth of a second to comprehend and put the starting signal into *action.*

Nothing so slow is necessary when the unlimited power of compressed air and the lightning speed of electricity are there to do the work as embodied by

National Pneumatic Door and Step Control with the exclusive Safety Interlocking features that start the car automatically and instantaneously from the first notch of the controller.

Make Your Peak Periods Produce Maximum Profits and Efficiency

National Pneumatic Company, Inc.

50 Church St., New York **Edison Bldg., Chicago**
Works: Rahway, N. J.

Count the fares collected not the passengers carried

Don't be misled into the belief that "business is good" just because the passenger traffic on your property is heavy.

In itself that means little. It's not the number of passengers carried but the number of *fares collected and turned over to the treasurer* that determines gross revenue and profits.

In other words, lost fares are a liability; or, look at it this way. "The recovery of one 5 cent fare, heretofore missed, means a *net profit* of 5 cents free from all operating charges."

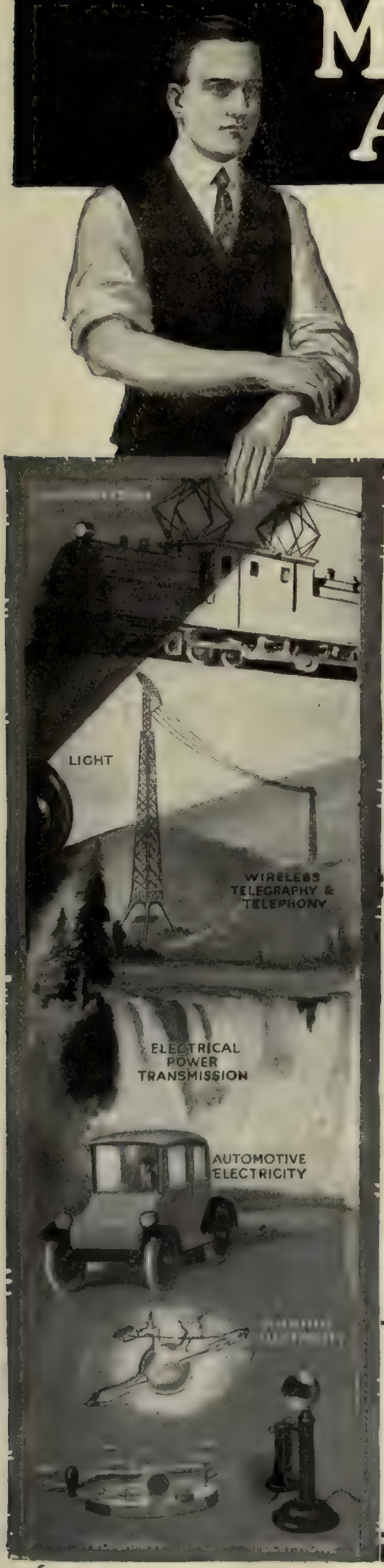
The function of Johnson Fare Boxes is to collect and register the fares "heretofore missed."

That they accomplish this result is evidenced by the fact that hundreds of progressive electric railways in the country are adding 3 to 10% to their receipts through their use, at the same time speeding up schedules and improving service.

Write to any of the more than 200 companies using Johnson Fare Boxes and verify this. Then write to our engineering department for complete data.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

More Good Men ARE WANTED


LIGHT
WIRELESS TELEGRAPHY & TELEPHONY
ELECTRICAL POWER TRANSMISSION
AUTOMOTIVE ELECTRICITY

Electrical Engineers Make Big Money

"Roll up your sleeves"—become an ELECTRICAL ENGINEER

You can qualify in a very short time

There has never been a time when the electrically trained man couldn't get a real man's sized job at a big salary. There have always been more such jobs than there were men to fill them. Today the demand is greater than ever. The wonderful possibilities of electricity are not half realized. New uses for electrical energy are being discovered every day.

Civilization Depends on Electricity

The profession needs more good men

The man who knows the fundamentals and knows that he knows them, gets the best positions. It is the trained man who gets ahead. He works with confidence, knows exactly what to do,—when and how to do it. There is no reason why you can't master this lucrative interesting profession quickly. The instruction we give you makes mastery easy.

Turn your idle hours into a profession to be proud of

Surely you have an hour or two a day that bring you in nothing—time that you waste. This time is worth money if you will use it right. You'll find our instruction interesting and easy to understand.

Where Technical terms are used they are explained and simplified

Now is the time to start—don't wait until a more convenient season. The sooner you start training the quicker you'll be classed as a regular Electrical Engineer with a big job and big pay. Send no money—use the coupon below—get our latest bulletin on this course—then decide.

American School of Correspondence
Dept. E 725
Drexel Avenue and 58th Street, Chicago, U. S. A.

It pays to train right—to follow the teaching of men who know from practical experience.

What This Man *Has Done* *You Can Do*

Pocatello, Idaho

Gentleman:

I have nothing but praise for your instruction courses * * * I am now manager of an automatic telephone company in this city. My success I attribute entirely to my Electrical Engineering Course with you, and take this opportunity of thanking you.

Yours very truly,
E. L. FARWELL

WE HAVE TRAINED THOUSANDS OF OTHERS—WHY NOT YOU? START NOW—MAIL THIS COUPON TODAY

AMERICAN SCHOOL OF CORRESPONDENCE, Dept. E725, Chicago, U. S. A.

I want job checked—tell me how to get it.

..... Architect	$5,000 to $15,000	..... Lawyer	$5,000 to $15,000
......Building Contractor	5,000 to 10,000	......Mechanical Engineer	4,000 to 10,000
......Automobile Engineer	4,000 to 10,000	......Shop Superitendent	3,000 to 7,000
......Automobile Repairman	2,500 to 4,000	......Employment Manager	4,000 to 10,000
......Civil Engineer	5,000 to 15,000	......Steam Engineer	2,000 to 4,000
......Structural Engineer	4,000 to 10,000	......Foreman's Course	2,000 to 4,000
......Business Manager	5,000 to 15,000	......Photoplay Writer	2,000 to 10,000
......Certified Public Accountant	7,000 to 15,000	......Sanitary Engineer	2,000 to 5,000
..... Accountant and Auditor	2,500 to 7,000	......Telephone Engineer	2,500 to 5,000
......Draftsman and Designer	2,500 to 4,000	..... Telegraph Engineer	2,500 to 5,000
......Electrical Engineer	4,000 to 10,000	......High School Graduate	In two years
......General Education	In one year	......Fire Insurance Expert	3,000 to 10,000

Name...Address...

Collier Service

Means a Fair Return and a Steady Return

Your most worthy reason for the preference of the public over the jitney interloper is that you have always given a service that takes the lean with the fat as a matter of duty and fairness.

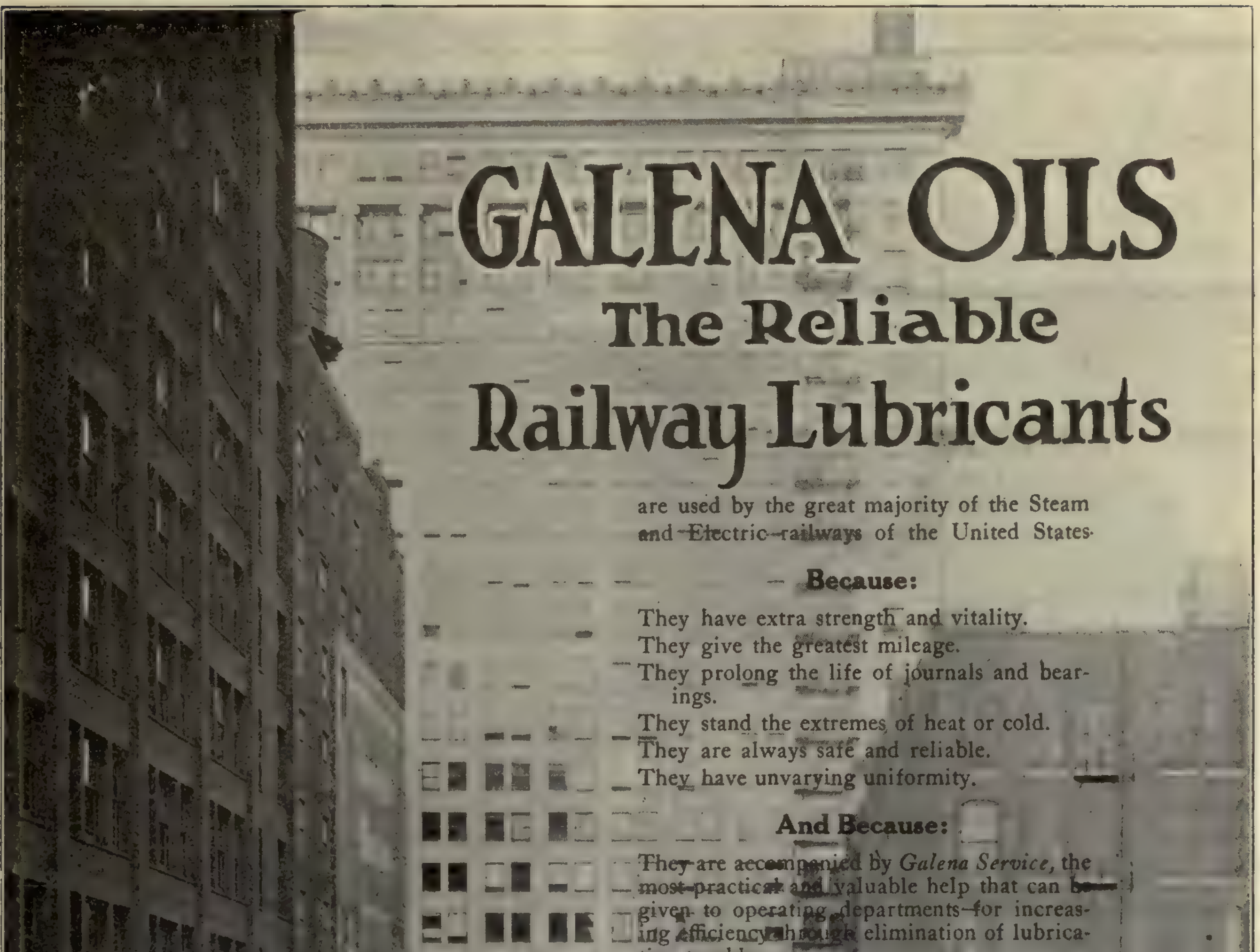
So, too, our most worthy reason for your preference is that Collier Service also takes the lean with the fat.

There is no offer of extraordinary profits this year and heavy losses for years afterward; but a fair and a steady return that leaves no care to you but the cashing of your checks.

When you sign a Collier contract you know exactly where you stand for the full term regardless of any fluctuations in the market for car card advertising, for that worry is up to us.

Barron G. Collier
INCORPORATED

Candler Building, New York



GALENA OILS

The Reliable Railway Lubricants

are used by the great majority of the Steam and Electric railways of the United States.

Because:

They have extra strength and vitality.
They give the greatest mileage.
They prolong the life of journals and bearings.
They stand the extremes of heat or cold.
They are always safe and reliable.
They have unvarying uniformity.

And Because:

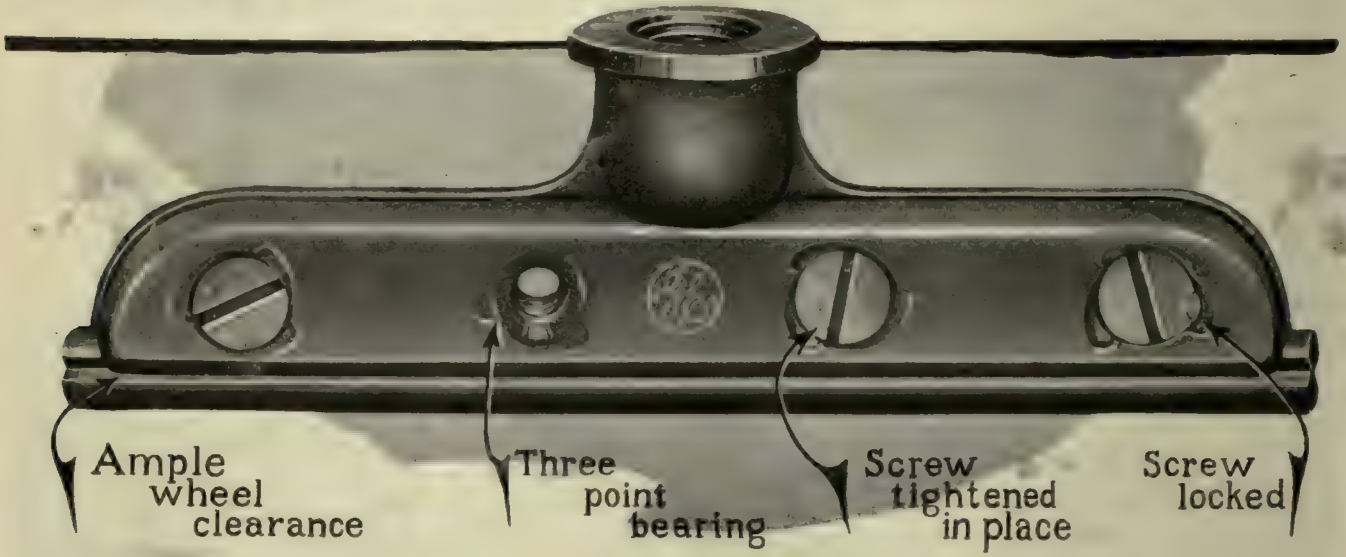
They are accompanied by *Galena Service*, the most practical and valuable help that can be given to operating departments for increasing efficiency through elimination of lubrication troubles.

Galena Oils and Galena Service are daily proving their economic value on hundreds of railroads by giving practical demonstrations of their ability to render maximum service at minimum cost.

Galena-Signal Oil Company

New York *Franklin, Pa.* *Chicago*
and all principal American cities
LONDON TORONTO BUENOS AIRES MONTREAL PARIS

Even in details of the overhead construction the degree of dependability, cost of installation and ease of replacement materially affect operating costs.



Exclusive locking feature insures dependability of Form A Clamp

Little features of design, exclusive G-E patents have placed the Form A clamp in a class by itself.

The triple lock countersink, for instance, makes it possible to lock the ear securely to the wire by a hammer blow on each screw-head opposite one of the nicks in the countersink. The screw thread is not damaged and yet the screw cannot back out in service. Thus the clamp is easily installed or replaced.

The bevelled lips of the clamp give ample trolley wheel clearance and G-E electric oven sherardizing protects the clamp from the weather.

Specify Form A Clamps on your next order

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

40-136

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Promptness at Meetings Urged on Convention Delegates

ONE of the greatest aids toward securing a maximum of results from the sessions at Atlantic City will be the promptness with which the delegates reach the meeting halls. The time which it is practicable for any one association to devote to business sessions is limited, being not more than three hours a day for three or at the most four days. If the cost of these meetings in the way of traveling expenses, etc., of the delegates should be divided by the number of minutes devoted to sessions the cost of each session-minute for each association would probably be found to be a very large sum, running probably into the hundreds of dollars. Of course, such a computation would not be entirely fair as to the cost of the time, because the benefits from meetings of this kind are not confined to the work done actually during the session. Nevertheless, while it would be hard to evaluate that time in actual dollars, it is admittedly great. Railroad men who know the necessity of maintaining schedules on their properties should be equally ready to do the same with their association meetings, and we hope that delegates will make a special point this year of being prompt at the meetings so they can be begun at the appointed times.

Quibbling About Pennies While Lavishing Dollars

"PENNY wise and pound foolish" is about the true characterization of the action of the people of some localities (or their so-called champions in public office). While they strenuously oppose an increase of 1 cent in the rate of fare on the street car, they lavish money on luxuries, insist on the best cuts of meat, wear silk stockings and silk shirts to work and think nothing of paying twice or three times as much for these items as they did before the war—if indeed they bought them at all before the war.

To look at this situation more concretely, consider for instance the building laborer of Chicago. In 1914, when the fare on the elevated lines was 5 cents, he could buy eight rides for an hour's wages. With the fare existing today, or 10 cents, this same building laborer can buy eleven rides for an hour's wages and have more than the price of a newspaper left over. His transportation today is relatively cheaper than it was six years ago. What has been said of the building laborer is pretty nearly true of workers in general.

Or looking at the problem in another way, it was pointed out to the citizens of Springfield, Ill., the other day that if their general household costs had increased no more than their electric light rates their grocery bill would still be the same as in 1910; if their coal bill had increased no more than their gas rate they would be paying only $2.75 a ton instead of $4.16; if their municipal taxes had increased no more than their car fare their city tax bills would be only 40 per cent instead of 128 per cent higher than ten years ago.

To think about these things seriously, and to take into consideration the fact that the times are in general prosperous and that every one, seemingly, has plenty of money, particularly the "poor, down-trodden laboring man," whose interests are always the subject of wordy protection on the part of politicians, practically forces upon one the conclusion that the opposition to increased fares is a thing of small concern to the average man and is almost wholly a misguided or pernicious activity of politicians in behalf of the non-interested public. It seems to us that the politicians would attract much greater public support and applause if they would utilize the energy and talk so liberally spent in fighting a penny or two increase in a 5- or 6-cent fare in a sincere effort to reduce the price of $18 shoes, $75 suits, 20-cent milk, $14 coal, exorbitant house rents, etc., any one of which items offers opportunity to produce a saving large enough to pay the family car fare for a year.

Special Fares Logical for Special Services

IN OUR larger cities, where two and even three forms of transportation are becoming available, namely, the surface car, the rapid transit train and the motor bus, the question arises as to whether these different forms of transportation with different speeds should charge the same rate of fare, at least when under one management. There seems to be no logical reason for such uniformity if we are to take an example from steam railroading. People who value their time are willing to pay more to ride on a fast train, although the accommodations offered are otherwise exactly the same.

An instance similar to city conditions is that of travel between the city and adjacent suburbs. We have in mind one case where the average commutation rate of fare is 20 cents and the running time thirty minutes, as compared with a combined trolley and rapid transit run which costs 10 cents and takes fifty minutes. Yet the majority of regular riders pick the double-fare service, apparently for two reasons; one, the greater speed, and the other, the assurance of a seat. A still more pertinent example of the natural tendency of the public to select the faster, costlier service was noted in the article on the Cleveland Interurban Railway in the July 31 issue of this paper. Many Cleveland workmen were stated to be paying 10 cents for a fourteen-minute ride in preference to paying 5 cents for a twenty-five-minute ride.

Why should the same fare obtain for a ride of given distance which is negotiable in sixty, forty-five or thirty minutes, as the vehicle selected varies from a street car averaging eight to ten stops per mile to a rapid transit line stopping but once or twice per mile? In most cases the distances given for the unit fare on our rapid transit lines are so long that even the passengers comment upon the ingenuity of the railway in meeting expenses, yet in the same city the same public feels that the surface railway fares ought to be decreased, if anything, to deserve their patronage for short-haul traffic.

Still another instance of special service for which patrons cheerfully pay is seen in the case of special accommodations furnished. Again referring to steam railroad practice, we see the Pullman parlor car and sleeping car as accepted and even welcomed because they supply special accommodations, for which special charge is paid without complaint, even though there is no gain in speed. And, further, in the case of the Fifth Avenue Coach Company and some other special forms of *de luxe* transportation, patrons gladly pay extra fares for the accommodations—such as open-air riding and the assurance of a seat, even though the speed is much slower. Compare, for example, a Fifth Avenue bus from 135th Street to Fourteenth Street with a subway express.

What we would point out is that special services deserve and will be accorded special fares. The determination of that fare is affected by both speed and accommodation, to say the least, and the answer may not always be simple. However, only force of habit or a public policy opposed to it can keep American operators from developing this desirable and proper differentiation in charge.

Transportation—
Knowledge Versus Ignorance

WE SOMETIMES think a little knowledge is dangerous and we are inclined to believe that lack of full knowledge in conception of the other fellow's work is the chief cause of the present street railway-motor bus controversy. This ignorance, if the term may be applied without malice, appears in three places—the motor bus companies, the street railway companies and the political arena. Each of the three agencies makes statements, quotes figures and argues from its respective standpoint and with its respective interests in view. We question the knowledge of each party regarding the transportation business and vehicle as developed by the other when considering the street railway and the motor bus companies and have little doubt of the ignorance of most politicians concerning either system.

Transportation knowledge is the essential key to the controversy and not expert knowledge of the mechanism of the street car, the motor bus or the body politic. Only through an intensive study of transportation can the place, type and function of the various agencies be determined, and there is little to stand on for either the motor bus company, the street railway company or the politician who attacks the problem from a selfish or narrow standpoint. We are frank to admit that the world moves and that transportation methods, vehicles, etc., are subject to change; we do not venture to predict the ultimate future type of surface transportation, but we are firm in our conviction that whatever the type, it will be used because it is the economic social and æsthetic solution to the transportation problem. The solution may involve the use of street cars, motor buses and other transportation types as yet unknown, but we maintain that the proper people to solve the problem are those who know transportation and attack the problem from that standpoint. The street railway companies are the big dealers in transportation, with fifty years' experience in transportation back of them. By all logic they should solve the transportation problems of the present and the future, whatever may be the agencies used in the traffic. Open-minded, intelligent effort along developmental lines should be the present policy of street railway companies, and right now there should be a well-directed effort to find the place of the motor bus in transportation and to use it in its logical place in connection with the existing systems.

Short-sighted conservatism and extravagant propaganda are alike out of place in dealing with public utility developments. Progress based on knowledge is the logical method for development to avoid disaster, and the street railways have the strategic position to obtain the facts and direct the development.

The Industry's Thinking as
Reflected in the Convention Programs

WE LOOK to the program of the American Electric Railway Association and its affiliated organizations to point out the high spots in the business by their selection of topics for the annual and other meetings. The interest which attaches to these topics is a measure of the virility and activeness of the industry, a sort of barometer, so to speak. Judged from this standpoint, the programs made up for the Atlantic City convention this year are excellent.

Taking up first the program of the parent association, we note a great diversity of subjects, although there is a certain unity about it. It covers mainly the motor bus, freight and express traffic, labor, fuel and rate of return. Looked at another way, the subjects group themselves roughly as relating to conducting present activities more effectively and the attempt to find new transportation fields.

Of particular interest at this time is the motor vehicle, truck or bus, and its relation to rail transportation. The vital question is that suggested in the title of the address to be presented by G. M. Graham, vice-president Pierce-Arrow Motor Car Company, namely, "The Motor Vehicle—Competitor or Ally?" The answer will be outlined by other speakers as well as him. Of course, the answer will be "Ally," but then we shall want to know how it is to become such. It has been much more successful as a competitor. This topic has and deserves a fine place on the program.

The association is fortunate in having captured Governor Allen to talk on labor matters. A more harmonious and consistent relation between men and management must be fostered. The Governor is bound to "say something" along this line.

Referring now to the programs of the affiliated associations, it is plain that these organizations are broadening out, although, of course, doing so along the lines of their specialties. To illustrate: The claims men will talk mainly about accident prevention and welfare work rather than the settling of claims; the engineers will discuss railroad electrification and the "super-power" plan, in addition to their committee reports; the accountants will take up the problems of general finance and the accounting profession as well as accounting details, and the transportation experts will consider merchandising as well as producing what they have to sell—rides.

Another fine thing about the convention program is the plan for fostering co-operation among the several departments of the electric railway organization. Viewed narrowly, inter-departmental interests ofttimes seem to conflict. Thus, the mechanical department wants the cars sturdy, to keep them out of the shop, whereas the power department wants them light, to conserve energy, and the transportation people, who operate the cars, sometimes have ideas of their own. But over and above their own petty interests these fellows are concerned with giving good service at a reasonable profit, and the more keenly they realize the fact the better. Such joint sessions as are provided at Atlantic City will foster real co-operation.

Coal Tests Aid the Purchasing Agent

IN THE present struggle to secure coal enough to keep the rolling stock and shop equipment moving, fuel testing and inspection look like needless refinements to many purchasing agents. Recent inquiries regarding the relation between coal tests and practical operating results brought the information that in certain companies very little interest is displayed in this matter at present. Not a few purchasing agents seem to think that if they succeed in landing carloads of coal beside the power house their duty is done, and even the executive circle is inclined to throw up its hands and trust to improved conditions in the future rather than attempt to have fuel analyzed and prices readjusted accordingly.

Under such conditions as now prevail it may not be feasible to purchase coal upon a B.t.u. basis or to settle bills therefor upon a standard of heating value only. Analyses and calorific tests, however, point the way toward fair settlements, and even if the purchasing agent cannot obtain fuel of the specified quality in many cases it is highly desirable that he should know what quality he *is* getting. In case more clearly normal conditions prevail later in the market the knowledge of variations sustained in these trying days will be very helpful and should be on record. If abnormal conditions prevail for years, blind buying without check-up tests will lose money to an unknown degree for the operating man. It is not unknown for a carload of poor quality coal to pass through four or five selling hands between the mine and the ultimate consumer, and at present costs, and with priorities accorded public utilities, the rejection of poor quality coal should be prompt and decisive, if based upon the specific information which the fuel expert can supply.

Finally, a study of the relation of plant efficiency to fuel market conditions emphasizes the importance of analyses as a means of ascertaining station efficiency. With the variations in quality now experienced in many localities, the pounds of coal burned per kilowatt-hour delivered at the station bus is not as good a measure of efficiency as the B.t.u. per kilowatt-hour. Without definite knowledge of the quality of fuel burned, obtained at short intervals, station performance becomes more a matter of guesswork than is well. Close "tabs" on fuel quality are needed all along the line. A movement toward more centralized fuel buying appears to be taking shape in the East, and the purchasing agent who tries to "go it alone" will do well to consider how his purchasing practice can be improved through expert aid and co-ordinated ordering.

What Will the Engineers Discuss at Atlantic City?

A MERE glance at the program arranged for the Engineering Association convention this year indicates the large amount of work that it is planned to accomplish. The other associations have blocked out a lot of work too, but by the very nature of their work a vast amount of detail falls to the engineers. Due to the suspension of activity of the various committees during the war period, a large amount of work was left over. This has been fairly well "cleaned up" by the present committees.

The subject of standardization, which is always an important one, sticks out all over the program. This is now of greater value than ever, because the manufacturer members are represented on each committee. One thing that is sure to come up for discussion in this connection is the effect that standardization has upon the cost of operation and maintenance of equipment. All engineers should come to Atlantic City prepared to discuss this topic, as there seems to be a diversity of opinion in regard to the effect of standardization in reducing cost. The far-reaching effect of standardization will be further emphasized in the papers and discussion on stores and purchases.

At the end of last winter, when certain localities were hard hit by blizzards and other evidences of winter, the study of the effect of severe winter conditions on equipment was assigned to the committee on equipment for investigation and report. Much valuable information has been collected, and this special report should again open up the subject at a time when the railways are ready to make improvements to meet the problems of the coming winter. In this connection the developments which have been made during the past year in perfecting insulation and making it impervious to moisture should form a subject of vital interest to the industry. Again, the lack of equipment for removing ice from between and along railway tracks was most forcibly brought to the attention of Eastern roads by the several severe ice and sleet storms during the latter part of last winter. A discussion of the remedies employed and equipment found useful in keeping cars in operation in spite of ice and snow would be helpful.

If operating engineers have any criticisms to offer in connection with the service obtained from equipment, these engineering sessions will afford an excellent place in which to bring points to the attention of the manufacturers. Many benefits can be derived from frank criticism and discussion, and the engineers of all manufacturing concerns are eager to assist in any way possible that will help to prevent and remedy troubles which are pointed out to them.

But equipment is not the only subject of engineering interest, although at the moment it is a salient one. The effects of the advances in the welding art upon track construction, the progress made in heavy traction and the problems of the power engineer are all entitled to full and conscientious consideration. The whole convention is going to be a worth-while affair, and the engineers are going to hold up their end.

The issue of Oct. 16 will contain full reports of the Atlantic City meetings of the American, Accountants', Engineering and Transportation & Traffic Associations

Kansas City Operation Analyzed

City Member of the Board of Control Makes His Sixth Annual Report on the Kansas City Railways—Discussion of the Traffic, Financial and Engineering Features of the Year's Operation

ROBERT P. WOODS, city member Board of Control, Kansas City Railways, has made his sixth annual report to the Mayor and the city's directors in the Kansas City Railways. Mr. Woods resigned Aug. 1, to accept a position as vice-president and general manager of the Kansas City, Clay County & St. Joseph Railroad, and was succeeded by Col. E. M. Stayton as city member Board of Control. On July 7, 1920, six years of operation under the new franchise had been completed, and during this time the personnel of the five city directors had been unchanged and Mr. Woods had served continuously as city member of the Board of Control. The present report, which is abstracted below, depicts conditions as of May 31, 1920.

During the first three years after the passage of the new franchise the company paid out $400,000 in dividends and had a surplus of more than $1,000,000 left in its property, but during the two years and eleven months following, although the gross income increased over that of the former period, the operating expenses increased so greatly that, considered as a whole, the company has created a deficit of more than $4,000,000. The operating ratio was about 70 per cent for the first three years after the passage of the franchise, but during the past two years and eleven months the ratio of operating expenses to gross earnings has been 95.9 per cent. There have been two increases in wages within the past fiscal year and, compared to conditions in 1916, the following table gives the percentage of wage increases:

Trainmen, first six months	127.28
Trainmen, second six months	116.27
Trainmen, second year	103.85
Trainmen, third year	83.33
Firemen	156.41
Oilers	156.41
Painters	55.56
Machinists	40.63
Track laborers	123.53
Linemen	89.66

Fare increases have been granted throughout the period of the franchise operation and at the present time there is a cash fare of 8 cents, a paper ticket rate of 7 cents when purchased in lots of five and a metal token which sells for 7½ cents.

The report shows a very interesting graphic tabulation of the proportion of cash fares to tickets during March, April and May, 1920, taking Wednesday, a normal day, as typical of average conditions. The tabulation shows that for each month 65 per cent of the receipts were in the form of metal tokens, 25 per cent were in the form of the paper tickets and only about 10 per cent were cash fares.

For the month of June, 1920, the average number of cars operated daily was 661.6, as compared to a daily average of only 579.2 for June, 1919. This increase was due to new equipment purchased and placed in operation where it was most needed and to a redistribution of the old equipment, which has in addition been put in better condition, thereby decreasing the number of cars in the shops for repair. John A. Beeler, traffic expert of New York City, has co-operated with the Board of Control in bringing about needed changes and betterment in service. There has been continuous and serious difficulty throughout the year with fuel, as to quantity and quality, and some trouble in the power house operation. Two new substations were placed in operation and automatic control equipment was placed in two other substations.

The gross income from the property for the last two years and eleven months was $25,595,566.97. The operating expenses were $24,500,070.11, leaving an operating income of only $1,095,496.86. Neither the 6 per cent on the capital value in Missouri nor that in Kansas was earned and the fixed charges for this period amounted to more than $5,000,000, thus making a deficit to fixed charges alone for the period of $4,228,936.40*

TRANSPORTATION AND CONSTRUCTION

The company did a considerable amount of reconstruction work during the period and the following estimate gives the cost for the complete reconstruction in 1920 of about 2 miles of single track on paved streets in congested districts, including the cost of dismantling, maintaining and constructing temporary diverting tracks:

Total cost $142,313.40, divided between material, $82,202.77, and labor, $59,815.63.

These figures show the extremely high cost of approximately $70,000 per mile for the reconstruction of track under heavy city traffic conditions with existing labor and material prices. The company spent more than $81,000 in making additions, betterments and renewals during the year, and of this sum $49,000 was spent for material and $32,000 for labor. The present total mileage of single track is 315.73, of which 249.149 is in Missouri and 66.581 in Kansas.

In discussing transportation the report brings out the fact that the situation in general looks much brighter than it has for three years. In the opinion of Mr. Woods the service is better now than it has ever been, especially when, in addition to many improvements made in regard to the tracks and additions to equipment, the following conditions are considered:

1. That more cars are in service now than there have been in the past, and this notwithstanding the fact that there are from 35,000 to 45,000 fewer passengers being hauled each day than there were three years ago.
2. That the service is better adjusted to the present needs.
3. That the speed of the cars has been increased, especially in the downtown districts.
4. That the intercity viaduct has been opened for street car traffic.

For the eleven months ended May 31, 1920, the company carried 111,263,827 revenue passengers with a car-mileage of 22,442,466 and a total passenger revenue of $7,842,696, as compared with the year ended June 30, 1919, which had 21,174,642 passenger car-miles, 109,-

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*The company was placed in the hands of a receiver on Sept. 9, 1920.—EDITORS.

273,320 revenue passengers and a total passenger revenue of $6,351,168. The great increase in operating expenses has been felt by the company, so that during the past eleven months it has been operating at a deficit.

INCREASED USE OF SAFETY CARS

During the past year the company has purchased and received sixty-five safety cars, making a total of ninety-five now on the system. While the appearance of the last sixty-five is very similar to the first thirty, there really is considerable difference in some of the details, such as the seating arrangement, entrance way, rear door mechanism, trucks and other things of less importance.

With the exception of two lines all of these cars have been placed in service on lines that do not enter the business districts. The cars on the two lines that do enter the congested business district were placed in service without the approval of the Board of Control. It has always contended that these cars are too small for the handling of large crowds. This is principally on account of the time consumed by passengers boarding and alighting from the cars, there being only one door, so that passengers desiring to board have to wait until passengers desiring to alight are out; when this has to be done through a crowd in a narrow roadway it certainly slows up traffic.

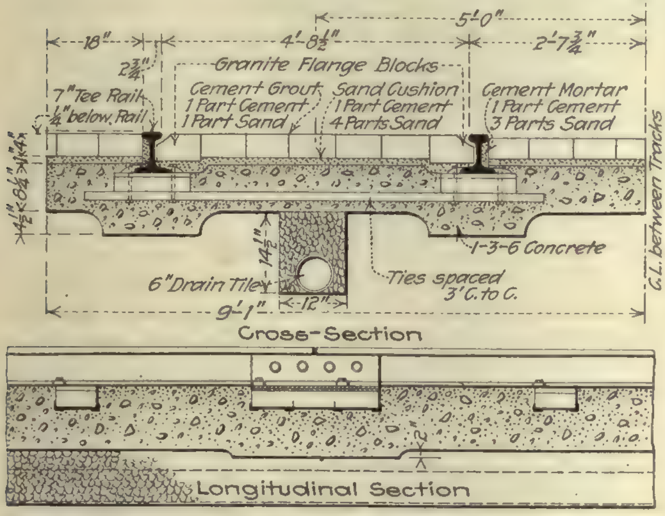
Traffic congestion has increased during the past year. The principal causes for this have been the narrow streets, the increased number of jitneys, the increase in the loading and unloading of vans, the increased number of privately owned automobiles and the freedom with which they are allowed to park, and finally the routing of too many street cars on certain congested streets.

However, an ordinance has been passed which eliminates jitneys from congested districts and also an ordinance has been passed regulating the parking of vehicles, so that after certain cars have been rerouted it is expected that this congestion will be relieved greatly.

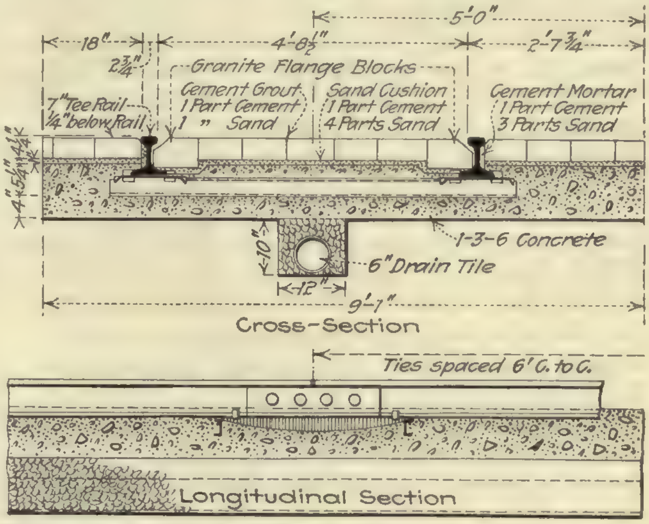
EQUIPMENT AND SHOP CHANGES

As a direct result of the strikes starting in December, 1919, there was a precipitous rise in the number of car pull-ins from approximately 670 in November, 1919, to about 2,500 in June, 1920. The utmost energy was expended during the year to overcome the handicap to service due to the large number of cars in bad condition. A vigorous and comprehensive overhaul program was undertaken under the direction of the railway company's equipment engineer. A steady decline in the number of pull-ins was the direct result, the number decreasing from approximately 2,300 in July, 1919, to about 800 for June, 1920.

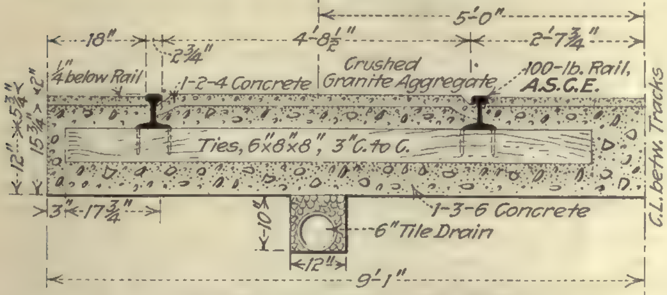
In this rehabilitation program the effect was concentrated upon mechanical and electrical details, such as the overhaul of trucks, controllers and motors. Calculation showed that it was physically impossible to keep up with the desired painting program without handicap to service on the street, and it was therefore decided to do only such painting as would not delay the placing of overhauled cars promptly in service.



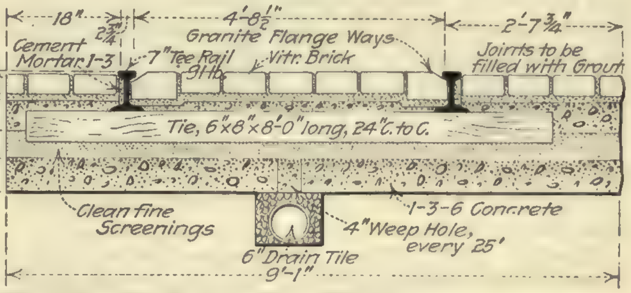
TRACK ON CONCRETE USING DAYTON MECHANICAL TIE, 7" TEE RAIL 91 LB., AND BRICK PAVING



TRACK ON CONCRETE USING INTERNATIONAL STEEL TWIN TIE, 7" TEE RAIL 91 LB., AND BRICK PAVING



JACKSON AVE. 9TH TO 12TH STS. CROSS-SECTION OF TRACK USING 100-LB. RAIL A.S.C.E.



8TH ST. McGEE TO TROOST & 10TH ST. McGEE TO TROOST PROPOSED TRACK CONSTRUCTION

SPECIAL TYPES OF TRACK CONSTRUCTION USED BY KANSAS CITY RAILWAYS IN RECONSTRUCTION WORK

In systematizing the overhaul program all passenger cars were classified in three groups, as follows:

Group 1—Wrecked and burned cars waiting decision as to disposal.

Group 2—Old cars unfit for passenger service, including cars still in service and cars out of service.

Group 3—All other passenger cars.

Group 3 was subdivided into three divisions, bad condition, fair condition and good condition.

As a result of the program a rather interesting cost record is available. Twenty-nine cars, group 1, were subjected to a complete overhauling and painting, from trolley to rail, and remodeling, at a cost of $1,000 per car. Twenty cars, group 2, were subjected to the overhauling and painting and remodeling at a total cost of $406.50 per car. Forty-six cars, group 3-A, were subjected to light overhaul and painting of body and complete overhaul of trucks, motors and control at a cost of $220 per car. Two hundred and sixty-one cars, group 3-B, were subjected to light overhaul of body and complete overhaul of trucks, motors and control without painting at a cost of $170 per car. Two hundred and twenty-two cars, group 3-C, were subjected to complete overhaul of trucks and motors only at a cost per car of $100. The time taken for the overhaul of the various classes was thirty days for the group 1 overhaul, fifteen days for the group 2, ten days for the group 3-A, five days for group 3-B and one day for group 3-C.

CHANGES IN SAFETY CARS

The experience with the first twenty-five safety cars purchased and placed in operation during the spring of 1919 showed that certain mechanical and structural changes as well as a general rearrangement were highly desirable, so that considerable time was spent by the engineers in an analysis of these cars and the preparation and recommendation of changes therein. Decision was early reached that more safety cars were desirable, and as the car makers were indifferent, if not antagonistic, to making any changes, it was necessary that the proposed changes be such as could be obtained from the car companies without too great distortion of existing standards and shop methods.

The principal changes made in the safety car are outlined as follows:

Structural strength of underframe materially increased.

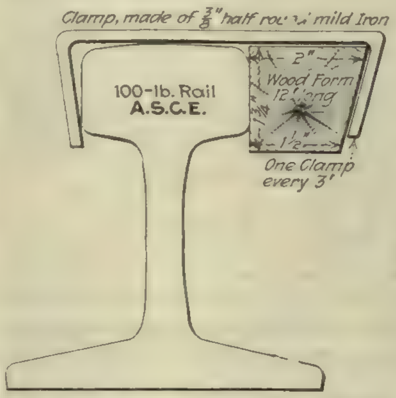
Seating and platform arrangement extensively revised to facilitate loading and passenger movement.

Twenty-four-in. cast wheels replaced by twenty-six-in. steel wheels, and specially designed rubber cushions installed in the truck suspension bolts to reduce noise.

A high-grade, full-rattan-covered, spring-upholstered seat replaced the slat seats. Maximum step height was reduced 2 in. Interior ceiling or head lining was added to improve appearance and warmth in winter. Thirteen heaters were installed instead of eight. Aluminum grab rail and stanchions were used instead of painted iron. Special design of projecting fender was installed instead of lifeguards, which have given unsatisfactory service. Heavier and better riding trucks were added. Low-voltage push buttons without exposed metal parts replaced high-voltage push buttons with exposed metal parts.

The above changes involved an increase in weight of approximately 1,200 lb. per car and an increase in cost above the cost of the standard safety car of approximately $200 per car. The revised weight was 15,000 lb.

During July, 1919, some experimental work was done under the direction of the board's engineer subsequent to his suggestion that it was apparently feasible to provide fan ventilation on Westinghouse 306 motors used on cars of the 800 and 900 series, thereby increasing the motor capacity sufficiently to haul double-truck trailers, seating about forty-seven passengers each. An experimental fan was built and the test results confirmed the estimate that between 20 and 25 per cent additional continuous capacity could be obtained, which would be sufficient to handle the largest trailer. At the same time an investigation was made of existing schedules to determine the possibility of using numerous motor car and trail trains. This resulted unfavorably, it being found that periods of minimum headway, that is under two minutes, were exceedingly short, so that the trail trains could not be used for any long period of time without making long headways, approximately four minutes, because of the large capacity of trains.



WOODEN FORMS USED TO FORM FLANGEWAYS IN CONCRETE

An investigation of the existing grades indicated that the apparent saving with trailers would have to be discounted somewhat because of the fact that the trains would be sandwiched in between single motor cars and also because slower acceleration would somewhat delay the motor cars, thus increasing the running time. The company replaced the register fare boxes with Woods lock fare boxes during September of 1919. The price of the new box with brackets was $45 per box.

POWER CONDITIONS DURING THE YEAR

The power situation has been critical throughout the year. The shifting personnel at the plant made it difficult to carry on the construction program, as well as very adversely affecting the power plant economy and upkeep. Combined with these factors was the serious difficulty of obtaining a good fuel supply, and it was only by the most vigorous methods that a sufficient quantity was obtained. The coal delivered was consistently about the poorest ever burned in the station.

The new Northeast power station was started during the year, and other principal construction jobs were the continuance of underfeed stoker installations, a new fan house and duct, a trial installation of extension of chain grates, with new type of arch, as well as starting construction of revised ash-handling facilities.

About the first of the year a Westinghouse development, in the nature of side wall tuyeres or air boxes, was installed in boiler No. 5, for the purpose of reducing the adhesion of clinkers to the side walls of the furnace. This trial installation was a wonderful success and an order was immediately placed for side wall tuyeres for the remaining eleven underfeed stokers. In spite of the extremely poor coal, some of it averaging less than 7,800 B.t.u. per pound, the underfeed stoker installation promises to fulfill the specifications as regards efficiency and capacity. The irregularity of the fuel and its poor quality has shown the decided advantage of the underfeed stoker in regard to maintaining fires. At times from four to six fires have gone out on the chain grates at the Missouri River Power Station, requiring their entire rekindling. This trouble was not entirely confined to the Missouri River Power Station, as it is understood that the new Northeast Power Station found difficulty in maintaining a capacity between 18,000 and 20,000 kw. with boilers intended for approximately 40,000-kw. output.

USE BOILERS AS EVAPORATORS

While considerable improvement has been made in the boiler feed water temperatures, the average is probably under 170 deg. F. Steps are being taken to install a bleeder connection between the third and fourth stages on the 15,000-kw. turbine and the auxiliary exhaust which passes close by the turbine. It is estimated that these connections will cost approximately $250. Check valves will be installed so that when the turbines are shut down or operated under light loads no steam will flow from the auxiliary exhaust to the turbine. When the turbines are operated at load, steam will be bled from the turbines into the auxiliary exhaust, enabling the water to come from the underfeed heaters at approximately 210 deg. instead of 170 deg. Besides the heat gained by this arrangement, it is hoped to deposit approximately two-thirds of the scale-forming compound in the heaters instead of in the boiler tubes. This will be accomplished by raising the feed water temperature in the heaters. Most of the carbonate scale will be deposited if the temperature is kept at about 180 deg., and it is estimated that at least two-thirds of the scale-forming compounds are carbonates.

The presence of scale and the large amount of boiler cleaning necessary have resulted in the loss of a considerable number of boiler tubes. In combination with the above bleeding scheme, the board's engineer recommended, and the suggestion is being placed in effect, that six boilers be used for purely evaporator service. Under this scheme all raw water will be sent to a certain group of boilers which will always be operated at relatively low ratings on account of the bad water conditions in them; all other boilers in the plant will then be fed from pure, condensed water.

No scale whatever would therefore exist in a great majority of the boilers in the plant, resulting in a higher efficiency of heat transfer, and making it unnecessary to waste heat for blowing down or causing delay for replacing any tubes. It is proposed to feed all raw makeup water to one of the small heaters on the north side of the boiler room.

POWER STATISTICS AND COST

The company generated 210,427,964 kw.-hr. in 1920, as compared to 202,264,946 kw.-hr. in 1919. The switchboard cost in 1920 was 1.2336 cents per kilowatt-hour; in 1919 this cost was 1.3264 cents per kilowatt-hour. The average price of coal per net ton in 1920 was $3.64, as compared with $3.74 in 1919. The average price of oil in 1920 was $1.68 per barrel, as compared with $2.56 in 1919. The fuel cost per kilowatt-hour in 1920 was 8.86 mills, while the labor cost was 1.38 mills. The company used 387,143 tons of coal during the year and 175,955 bbl. of oil. The company averaged 3.926 kilowatt-hour per car-mile in 1920, as compared with 4.250 kw.-hr. per car-mile in 1919.

BEELER'S REPORT

Mr. Woods publishes the report of John A. Beeler, traffic expert, who was retained by the Board of Control to study Kansas City conditions and to make recommendations for relief.* The report speaks of Mr. Beeler's work in a complimentary manner and states that conditions have been greatly relieved through the adoption of his recommendations.

Since the Wood report was issued, the Kansas City Railways has been placed in the hands of a receiver, as has been noted in these columns. An account of the receivership and the causes leading up thereto is given in the Financial and Corporate Section of the ELECTRIC RAILWAY JOURNAL this week.

The South African Railway Administration is going ahead with the electrification of the Cape Town-Simonstown line and the Durban-Pietermaritzburg line, involving an expenditure under present price conditions of nearly four and one-half million pounds sterling. This is part of the general electrification plan mentioned in the issue of this paper for Jan. 10, 1920, page 102.

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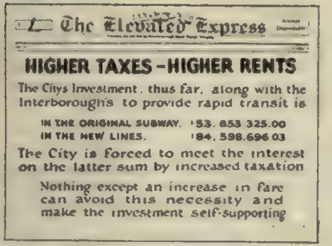
*Five sections of this report have been reviewed in ELECTRIC RAILWAY JOURNAL, issues of Feb. 14, April 3 and Aug. 14.

Reproductions of recent issues of the "Subway Sun" and "Elevated Express," which tell their own story



The Elevated Express

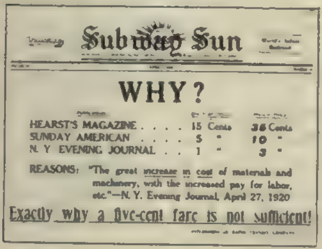
HIGHER TAXES–HIGHER RENTS

The Citys Investment, thus far, along with the Interborough's to provide rapid transit is

IN THE ORIGINAL SUBWAY.	$53,853,325.00
IN THE NEW LINES.	$84,598,696.03

The City is forced to meet the interest on the latter sum by increased taxation

Nothing except an increase in fare can avoid this necessity and make the investment self-supporting



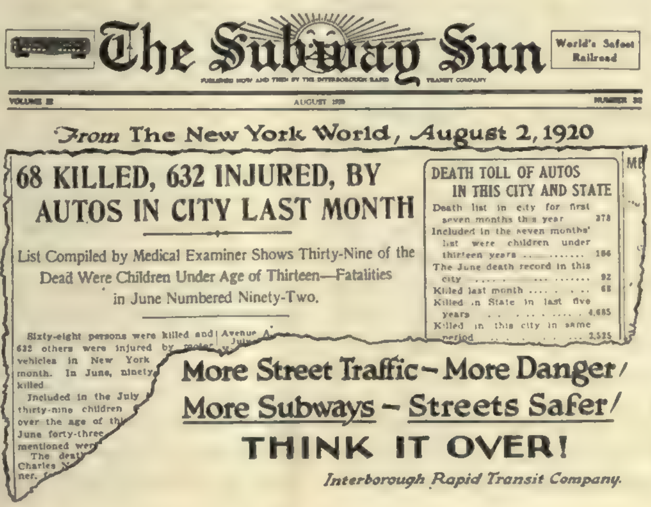
Subway Sun

WHY?

HEARST'S MAGAZINE	15 Cents	35 Cents
SUNDAY AMERICAN	5 "	10 "
N. Y. EVENING JOURNAL . .	1 "	3 "

REASONS: "The great increase in cost of materials and machinery, with the increased pay for labor, etc."—N. Y. Evening Journal, April 27, 1920

Exactly why a five-cent fare is not sufficient!



The Subway Sun

World's Safest Railroad

From The New York World, *August* 2, 1920

68 KILLED, 632 INJURED, BY AUTOS IN CITY LAST MONTH

List Compiled by Medical Examiner Shows Thirty-Nine of the Dead Were Children Under Age of Thirteen—Fatalities in June Numbered Ninety-Two.

Sixty-eight persons were killed and 632 others were injured by motor vehicles in New York
month. In June, ninety
killed
Included in the July
thirty-nine children
over the age of th
June forty-three
mentioned wer
The deat
Charles
ner,

DEATH TOLL OF AUTOS IN THIS CITY AND STATE

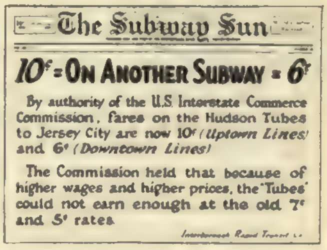
Death list in city for first seven months this year	278
Included in the seven months' list were children under thirteen years	106
The June death record in this city	92
Killed last month	68
Killed in State in last five years	4,685
Killed in this city in same period	2,525

More Street Traffic – More Danger!

More Subways – Streets Safer!

THINK IT OVER!

Interborough Rapid Transit Company.

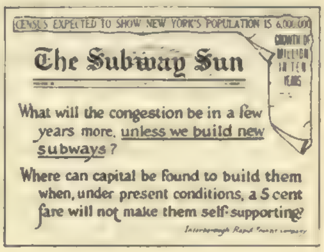


The Subway Sun

10¢ = ON ANOTHER SUBWAY = 6¢

By authority of the U.S. Interstate Commerce Commission, fares on the Hudson Tubes to Jersey City are now 10¢ *(Uptown Lines)* and 6¢ *(Downtown Lines)*

The Commission held that because of higher wages and higher prices, the "Tubes" could not earn enough at the old 7¢ and 5¢ rates.



CENSUS EXPECTED TO SHOW NEW YORK'S POPULATION IS 6,000,000

The Subway Sun

What will the congestion be in a few years more, unless we build new subways?

Where can capital be found to build them when, under present conditions, a 5 cent fare will not make them self-supporting?

Utility Situation Reviewed

Committee of Investment Bankers' Association Reports Utility Situation Encouraging—Status of Public Utilities Considered

AT THE annual meeting of the Investment Bankers' Association, held this week in Boston, O. B. Willcox, vice-president Bonbright & Company and chairman of the committee on public service securities of the Investment Bankers' Association of America, presented an extended and able review of the public utility financial situation in this country. According to Mr. Willcox:

> The public utility situation is distinctly encouraging. The functions of public service are better understood, their financial problems are recognized and are being solved. The critical observer cannot escape the just conclusion that the public in limiting the rate of return on utility investments has become responsible for a fair return. The events of the year have confirmed the conclusion of those operators and regulators who have pointed out that the most efficient utility is the prosperous utility. The demand for the great expansion of all public utility service comes not from the owners and operators but from the public. It is not too much to say that public regulation of utilities in the United States has reached a point where its principal function is recognized to be the provision of adequate public service through just rates sufficient to attract the capital needed for their expansion.

According to Mr. Willcox, utilities have taken their places in the public mind as no longer either merely conveniences or luxuries or merely private enterprises interesting only to their owners, but as great and essential tools of industry, no less important in their fields than the railroads, the banks and the post office. They are not mysterious or impressive aggregations of predatory wealth, but they are human accomplishments composed of materials and money and men, subject to the immutable economic laws that govern all human industrial endeavor.

The public has also come to realize that these systems must expand or they are no longer efficient public servants, and that new money can be drawn only from the investment funds of the country, accumulated out of the savings of the industrious and thrifty, and that, in their requirements for capital, these utilities compete with all the attractive and profitable opportunities offered to capital anywhere in the world.

Continuing, Mr. Willcox pointed out that under regulation, which now prevails throughout the country, the amount of capital invested in the utilities is limited to a fair and reasonable return, so that the money of speculators will not flow into this channel. Only those seeking investments with a limited return will provide the capital required, but they in turn must be assured of the certainty of their principal as well as of the promised income. The public, therefore, in regulating its utilities has at the same time assumed responsibility for both protecting the capital invested in public service and assuring its reward in the form of interest and dividends.

The recent water power bill is considered by Mr. Willcox to be an example of practicable legislation, and many hundreds of thousands of electrical horsepower will be speedily developed under its terms, if the newly created water power commission administers the act so that powers developed on the public lands and navigable streams "will not be so handicapped by vexatious restrictions and administrative expenses that they cannot successfully compete for their capital requirements and for the sale of their output with power generated by fuels or on streams not under Federal jurisdiction." Some fifty applications for permits have already been filed with the commission, contemplating the development of several hundred thousand electrical horsepower.

The speaker also referred to the study now being conducted by the United States Geological Survey of the power resources of the Atlantic seaboard between Boston and Washington.

Mr. Willcox quotes extensively from the report of the Federal Electric Railways Commission, a report with which, he says, it is important that bankers throughout the country should be familiar. Continuing, he says:

> As in all industrial enterprises, the fundamental requirement for efficient street railways is credit, and the handling of credits in the large volume required is the peculiar function of investment bankers; they can do great public service in lending their advice and aid in the rehabilitation of street railways by counseling those readjustments that will most speedily re-establish street railway credit, and they will thereby serve their own interests in promoting the prosperity of their several committees and in creating large volumes of sound securities which they can handle at fair profit.
>
> Even before the filing of the commission's report there was an obvious endeavor on the part of the regulating officials throughout the country, with very few exceptions (of which New York City is the most conspicuous), to make the rates of fare flexible so as to meet the requirements of each separate situation. The increases in rates granted have gone a long way toward establishing a basis for the rehabilitation of the credit of the street railway systems of the country.

A section of the report is devoted to the practice during the last few years of many companies to secure a local distribution of their securities by selling them to their customers and patrons. It is estimated that upward of $100,000,000 of utility securities have so been sold since the outbreak of the war. Such a plan should be encouraged for many reasons.

Discussing another phase of financing utilities, the report points out that the corporate and financial structure of many utility enterprises has proved to be disappointing (1) in not providing adequately for continuing financing to make money provision for constant growth and expansion, and (2) in relying too largely on fixed obligations and not providing sufficient equity represented by shares of stock. The rapid growth of utilities could not perhaps have been foreseen, it was said, but now that continued growth and expansion are recognized as inevitable incidents and functions of efficient and successful utilities the bankers advising and directing the development and growth must guard against the consequences of inflexible financing, which has both hampered the proper expansion of utility service and sometimes brought disappointment and loss to bankers and investors. The banker called on to market utility bonds has perhaps been too much governed by the old precedent of limited issues of sinking fund mortgage bonds. While these constituted a proper part of the financial structure of fixed, static and non-expanding enterprises, they have proved altogether inadequate to modern utility financing and will be more disappointing in the great utility expansion which is clearly in sight. Bankers must adopt the form of mortgage which while affording adequate security will permit and promote, not obstruct or hamper, the growth which is inseparable from successful and sound utility enterprises. The report then calls attention to the need of adequate stock issues and says that the principles of the non-par value stock are now better understood than formerly and their use in public utility capitalization is to be encouraged, as it would simplify some of the problems and encourage investment in utility enterprise, which is so necessary.

Motor Buses as Railway Auxiliaries

The Aggregate Number of Electric Railway Companies Which Are Now Operating Bus Lines Is Not Large—Some Statistics and General Conclusions Are Given

MOTOR BUS WITH TRAILER IN AUXILIARY AND SUPPLEMENTARY SERVICE OF THE OKMULGEE (OKLA.) TRACTION COMPANY

AN EFFORT was made recently by this paper to tabulate the electric railway companies which are operating bus lines. The result is shown in the accompanying list. Cases of buses owned by the same interests as the trolley lines but operated as entirely independent enterprises, of which there are a few, are not included. Notes are appended in regard to some of these properties.

MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

This company operates a bus line about 1½ miles in length which connects two radiating street railway lines and intersects a third railway line about midway in its route. The company has never felt that the business warranted the necessary capital expenditure for a railway line and installed the bus line as a compromise measure. The service furnished is comparable with street railway service in headway, average speed, rates of fare and transfer privileges. The present buses are Nash 2-ton truck chassis, carrying a special body built by the company with a total weight unloaded of 6,700 lb. They will seat twenty-four passengers and permit sixteen additional passengers to stand, and are one-man operated.

The results of operation have been very satisfactory and, on the basis of July business, the line will handle 500,000 revenue and 300,000 transfer passengers during the year. In spite of the high transfer ratio the earnings average 35 cents per bus-mile.

The company's experience up to this time indicates the desirability of motor buses to furnish service in outlying districts, on crosstown routes or on extensions to existing car lines where traffic is more or less uniform during the entire day on account of their low initial investment. In view of its limited carrying capacity, however, this advantage of a bus largely disappears on lines having heavy peak load conditions.

The buses in Milwaukee were installed in April, 1920, and make approximately 85,000 bus-miles per year with two buses in constant service.

CONNECTICUT VALLEY STREET RAILWAY

This company installed a motor bus route in November, 1919, as a supplement to its street railway system. Two buses are needed to maintain the schedule and the third is held as a reserve. The bodies are mounted on lengthened Cadillac chassis and have a seating capacity of nineteen with an unloaded weight of 5,500 lb. The buses operate about 240 miles per day. The fares are collected by the Rooke register. A minimum fare of 10 cents is charged, with 5 cents for each additional zone. Further particulars of this line will be found in the ELECTRIC RAILWAY JOURNAL for April 24, 1920. In a recent letter the company says: "So far our judgment, as it is formed by our limited experience, is that there are some sections of territory which need transportation and that the use of the motor bus provides transportation at a minimum capital outgo. The public apparently likes to ride in the buses, and we believe the buses are the proper things to use for our situation. They have disadvantages in that they are expensive of maintenance, and we had weather conditions last winter that made it impossible to operate them when street cars operated very well in the same territory. They cannot handle peak loads and the use of many buses would badly congest highways as against other users. If normal costs were in vogue today we think we would try the motor bus experiment a little further in one or two other sections."

BALTIMORE TRANSIT COMPANY

The system of this company, which is associated with the United Railways & Electric Company of Baltimore, was described at length in an article on page 13 of the issue of this paper for Jan. 3, 1920, so a brief statement only will be given. Twenty single-deck buses are used, each with a seating capacity of sixteen and a weight of 7,000 lb. The present buses were installed in August, 1917, but the original service was instituted in 1915.

No transfers are issued to the trolley lines, and for 1919 the buses carried 1,958,915 passengers with a bus-mileage of 367,131. The installation in Baltimore has proved the value of the motor bus there to give a supplemental and also auxiliary service. The chief disadvantages found have been high operating costs and small carrying capacity.

MUNICIPAL RAILWAY OF SAN FRANCISCO

This railway system installed rented buses in 1917 and owned buses in January, 1918, as feeders to its street car lines. Five buses are operated, each seating nineteen passengers and with a capacity of thirty. The bus weighs 7,800 lb., including the 1½-ton chassis. During the year ended June 30, 1920, the bus-mileage was 236,797 and the buses carried 784,295 passengers. A financial statement for the last fiscal year is given in detail in Table I.

Transfers are free at all connecting points. A statement accompanying this report says: "In a new district where the travel will not justify the initial cost of railway construction and the people have no other means of transportation, buses may be used to advantage, although they are expensive to operate and are small units." The lines operate at a loss of about 13 cents per bus-mile, with receipts of 13 cents per bus-mile and expenses 26 cents per bus-mile. The fare is 5 cents, with 2½-cent school tickets and local transfers for the same price as the school tickets.

TABLE I—MUNICIPAL RAILWAY OF SAN FRANCISCO—STATEMENT OF BUS LINE OPERATIONS FOR FISCAL YEAR ENDED JUNE 30, 1920

Receipts:			
Route No. 1, Tenth Avenue and Fulton to Twenty-fifth Avenue and Irving Street	$14,982.60		
Route No. 2, Great Highway, Cabrillo to Sloat Boulevard	7,693.70		
Total receipts		$22,676.30	
Operating expenses:			
Account Number 39 A, repairs to motor buses	$15,479.29		
Account Number 78 C, conductors, chauffeurs, buses	15,995.50		
Account Number 78 D, garage expenses, buses	12,205.96		
Account Number 39 A, tire expense	13,023.96		
Total operating expense		$56,704.71	
Operating loss			$34,028.41
Reserves:			
Depreciation (18 per cent of receipts)	$4,081.72		
Compensation insurance	663.46		
Total reserves			$4,745.18
Gross excess of expenses over receipts:			$38,773.59
69 Q.M. tickets at 5 cents	$3.45		
6,708 school tickets at 2½ cents	167.70		
322,520 local transfers, at 2½ cents	8,063.00		8,234.15
Total revenue credits:			
Net loss			$30,539.44
Average net loss per day			83.44
Bus-Mileage—236,797			
Receipts per bus-mile (revenue credits not included)			0.095
Receipts per bus-mile (revenue credits included)			.13
Total expenses per bus-mile			.259
Net loss per bus-mile			.129

FRESNO TRACTION COMPANY

This company has been operating a motor bus route since July, 1916. It uses two buses, which make a bus-mileage per year of about 27,000 and carry 50,000 passengers. The bus is a single-deck affair with a seating capacity of fifteen and a weight of 5,000 lb., including the Moreland chassis and built-up top.

The routes serve as feeders to the railway. The company does not see any advantages in the use of the motor bus and says that "the cost of operation per car-mile in regular street car work is about 9 to 1 in favor of the cars." It hopes to discontinue the buses as soon as possible.

TWIN CITY RAPID TRANSIT COMPANY

In 1918 the Twin City Rapid Transit Company purchased thirty-eight jitney buses then in competition with its cars and started to give a bus service at a 5-cent fare with free transfers to the trolley cars. The experiment, however, was not very successful, as never more than half of the buses were able to operate at one time, the others undergoing repairs. During the last year of operation it was rarely possible for the company to keep even thirteen buses in regular service. The buses consisted of a seven-passenger chassis with bus body, and with a seating capacity of fourteen passengers each. These buses were discontinued on April 30, 1920, and a trolley line is being built over the former bus route. The company writes: "We have proved to our own satisfaction that we cannot operate motor buses on a 5-cent fare and break even, and it would seem that a 10-cent fare at least would be required for profitable operation."

WINNIPEG ELECTRIC RAILWAY

The Winnipeg Electric Railway owns twelve one-man buses. The latest type was described on page 505 of the issue of this paper for Sept. 11, 1920. Five of these have been in operation since May 10, 1918. Of these three were used on schedules and two in reserve. These buses weigh 3,700 lb. without load and seat sixteen passengers. A bus mileage of 111,920 was made during

TABLE II—STATISTICS FROM TEN ELECTRIC RAILWAYS USING MOTOR BUSES IN AUXILIARY SERVICE

Name of Company	Location	Use of Motor Bus	Number of Buses Operated	Date Installed
Milwaukee Electric Railway & Light Company	Milwaukee, Wis	Supplementary	2	April 17, 1920
Connecticut Valley Street Railway	Greenfield, Mass	Supplementary	3	Nov., 1919
Baltimore Transit Company	Baltimore, Md	Supplementary	20	Aug. 1, 1917
Municipal Railway of San Francisco	San Francisco, Cal	Feeders	7	Sept. 1, 1917
Fresno Traction Company	Fresno, Cal	Supplementary	2	July, 1916
Pacific Electric Company	San Bernardino, Cal	Supplementary	4	1917
Peninsular Railway	San Jose, Cal	Feeders	2	1919
Dubuque Electric Company	Dubuque, Iowa	Supplementary	3	1919
Winnipeg Electric Railway	Winnipeg, Canada	Supplementary	12	May 10, 1918
Okmulgee Traction Company	Okmulgee, Okla	Supplementary	6	1920

the twelve months ended June 30, 1919. The maximum mileage made by a bus during a single month was 3,800. Transfer regulations are carried out the same as for electric cars. In a recent letter the company says: "One of the chief advantages of the motor bus is that service can be extended into new territory which demands transportation with a minimum of immediate capital expenditure. The chief disadvantages of motor buses as compared with street cars are more frequent breakdowns and interruptions to service and the necessity for side trips off the line for gasoline, etc. The future policy of our company in regard to the use of the motor bus will be the same that has governed our past procedure in this respect. We do not think that the motor bus will ever take the place of a street car, except possibly on small shuttle lines and where breaking into new territory. We regard the bus merely as a temporary expedient until traffic conditions warrant the extension of our track and investment in rolling stock."

Since the early part of this year the company has had two Sterling buses in operation in addition to those previously mentioned. These are used on the Stock Yards route to replace a stub-line car.

PENINSULAR RAILWAY COMPANY

The company states that "at the present time we are operating but one motor bus regularly, it being in service on Hobson Street, San José, in lieu of a remote car line which we obtained permission to abandon if we would substitute the bus service. The bus is operated at a great loss in view of the fact that the revenue taken in on the bus, which is in operation about eighteen hours a day, amounts to about $2.50. So, therefore, we are unable to give satisfactory figures pertaining to bus operation under conditions of this kind. We also operate a bus line to Oak Hill Cemetery on Sundays and holidays only. This was also done to secure abandonment of a remote narrow-gage line, and conditions surrounding this operation are similar to those on Hobson Street."

VIEWS OF ONE OPERATOR

One operator of extended experience who has made a study of the bus situation has reached the following conclusions:

Efficient, adequate and cheap means of urban transportation are indispensable to the welfare of cities.

Electric railways have and are supplying this. They are a part of the social, economic and industrial life of cities. They are permanent institutions which, in their proper sphere, nothing as yet devised can supplant.

Communities where electric railways operate have a vital interest in their prosperity, because upon this depend the quality and quantity of service rendered.

In the field of urban transportation, and particularly where mass transport is involved, the motor bus as at present constituted is not an adequate substitute for the electric railway, for the following reasons:

1. If all factors involved are taken into consideration, such as the length of ride, equitable taxation, allowance for depreciation, etc., it is found that the bus is not as economical as the electric car operated over steel rails.

2. The physical limitations of highways make the motor bus undesirable as a means of mass transport because of:

(a) Increased street congestion.
(b) Increased accident hazard.

3. Climatic conditions in some parts of the country do not permit all-the-year-round efficient operation of the motor bus.

Though the electric railway cannot in its proper sphere be supplanted by the motor bus as at present constituted, the service it renders can under certain conditions and in a measure be supplemented by automotive vehicle operation, particularly as follows:

1. The motor bus can act as a feeder line in suburban or urban sparsely settled territory.
2. The motor bus can act as a link.
3. The motor bus can under certain conditions furnish a *de luxe* service.

Where the need of motor bus service is found and determined to be economically sound, an opportunity should be given the existing transportation agency—the electric railway—to furnish such service. Monopoly in the public utility field is essential to efficient and economical operation from the community point of view as well as from the utility point of view.

With the advent and development of the automobile, the electric railways no longer have a monopoly in the field of urban transportation.

The rapid development of the automobile has had a tremendous and disastrous effect upon the earnings of electric railways and consequently upon the quality and quantity of service furnished by them to the public.

Efforts to supplant the electric railways with the automobile have injured the electric railways, but more so the communities served.

The unfair competition of the automobile did not solve the urban transportation problem; on the contrary, it made the solution more difficult by rendering inoperative an agency which the automobile cannot replace.

The automobile has benefited by the construction of good roads and highways, frequently paid for by the street car rider in the form of a paving tax.

The operation of the automobile should be regulated and its operating requirements made no less onerous than those imposed on the street car.

Wholesale Prices in August

A PRONOUNCED drop in the general level of wholesale prices in the United States from July to August is shown by information collected in representative markets by the Bureau of Labor Statistics of the United States Department of Labor. Measured by changes in the bureau's weighted index number, in which each commodity has an influence proportionate to its importance in the country's markets, the decrease was more than 4½ per cent.

Food articles showed the greatest price recessions, the decrease for the group as a whole being more than 12 per cent. Farm products, containing many basic food materials, declined nearly 6 per cent. Cloths and clothing followed closely, with a decrease of approximately 5¾ per cent from the July level. Smaller decreases were recorded for the groups of building materials, chemicals and drugs, and miscellaneous commodities, the latter including, among others, such important articles as bran, cottonseed meal and oil, jute, rubber and soya-bean oil. Fuel and lighting materials, on the other hand, continued upward, with an increase of more than 6¼ per cent. Metals and house-furnishing goods also showed a net advance from the preceding month.

Are You Ready for the Coming Winter?

The Causes for Your Trouble Are Explained and the Author Outlines Some Practical Methods Which May Be Used in Advance to Minimize the Possibility of These Troubles

BY J. S. DEAN
Railway Motor Engineering Department Westinghouse Electric & Manufacturing Company.

TO COPE WITH SNOW LIKE THIS TAKES PREPARATION AND FORETHOUGHT

THE problem of operating street cars during the winter season, particularly in localities subject to heavy snowstorms, is one that vitally interests all street railway men from the president down through the organization and including the men in the shops and carhouses. To the officials this problem is evidenced in a financial loss, due to reduced earnings and increased operating expenses, and in a possible antagonistic public sentiment very detrimental to the interests of the company. To the average employee of the company the winter weather means longer hours of labor, followed by physical discomforts, and in spite of increased earnings and larger pay envelopes the employee becomes inefficient and discouraged, resulting sometimes in a general breaking down of the morale.

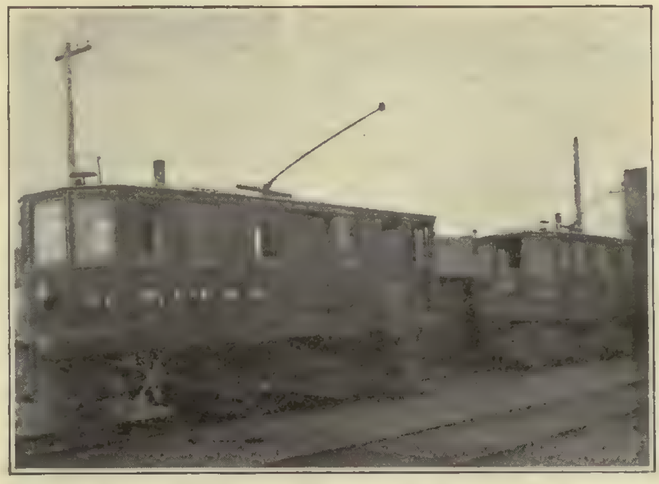
Interest in this subject varies between a maximum and a minimum, depending upon the geographical location of the operating company. Operators in the extreme South need give this subject but a passing thought, while those facing such conditions as shown in some of the accompanying illustrations are vitally interested. It is generally conceded that a line passing through Washington, Cincinnati and St. Louis, approximately the 37th degree of latitude, represents an intermediate point between the two extreme conditions referred to.

THE REASONS FOR MOTOR FAILURE ARE MANY

Careful analysis on a number of street railway properties of the operating conditions and equipment failures during the winter season, combined with an expression of opinion from a number of men closely allied with the railway industry, shows the following primary causes as being largely responsible for equipment failures at such seasons:

1. Heavy snowstorms blocking the track, submitting equipment to an undue overload.
2. Inadequate and inefficient snowfighting equipment being unable to keep tracks clear, thus compelling the use of passenger cars to do a large share of this work.
3. Snow and ice packed between the rails by automobiles and heavy trucks. Under these conditions cars are lifted off the rails by motors riding on the ice, resulting in spinning of the wheels and roasting of the windings. Motors overloaded and sometimes burned out as a result of gear cases rubbing open on the ice and allowing the snow and ice to pack in the case, jamming the gears.
4. When a thaw comes the snow melts rapidly, and with sewers choked and consequent poor surface drainage abundant water and slush collect on the tracks and through this the cars must operate, resulting in wet motors caused by wheel splash and pocketing of water in depressed sections of the track.
5. Cars used to pull in cripples, thus overloading the motors.
6. Equipments in a general rundown condition, in most cases due to forced neglect of maintenance, and equipments physically unfit to meet emergencies caused by overloads.
7. Overworking all available equipments as a result of the many crippled cars in the carhouse and the increased travel due to poor weather conditions.
8. An increased number of mechanical failures due to the extreme low temperature, frozen condition of roadbed, and to the action of the frost on roadbed and track.
9. Sweating of motors that are parked in zero weather all night after being worked to the maximum temperature the previous day.
10. General demoralization of schedules due to crippled cars and stranded automobile trucks tying up traffic.

A RAILWAY SUBJECT TO SUCH OPERATING CONDITIONS AS THIS IS VITALLY INTERESTED IN PREPARATION FOR NEXT WINTER



THE SNOW SWEEPER IS BEST ADAPTED TO LIGHT SNOW AND FOR GENERAL WORK IN REMOVING SNOW FROM CITY STREETS

11. Rough and careless handling of the equipment by the trainmen, who are forced to make up lost time due to unavoidable delay.

12. Extreme cold weather, with resulting uncomfortable condition of the pits and carhouses, reducing the efficiency and the morale of the workmen and causing makeshift repairs and poor maintenance.

13. Poor shipping facilities, resulting in a scarcity of repair parts which are necessary to maintain the equipment properly.

THE WEATHER MAN TREATS 'EM ALL ALIKE

The experience of the past few years, and especially the past winter, in certain localities has demonstrated the fact that adequate preparation must be made in order effectively to cope with the heavy snowfall and severe winter weather conditions. An efficient snow-fighting organization with effective equipment must be maintained to combat these unusual operating conditions.

Evidence collected from fifteen representative operating companies by an official of a large railway company in New England was segregated and tabulated and showed that armature failures due to severe winter conditions during the early part of the present year were on the average about equally divided between those of the two large motor manufacturers.

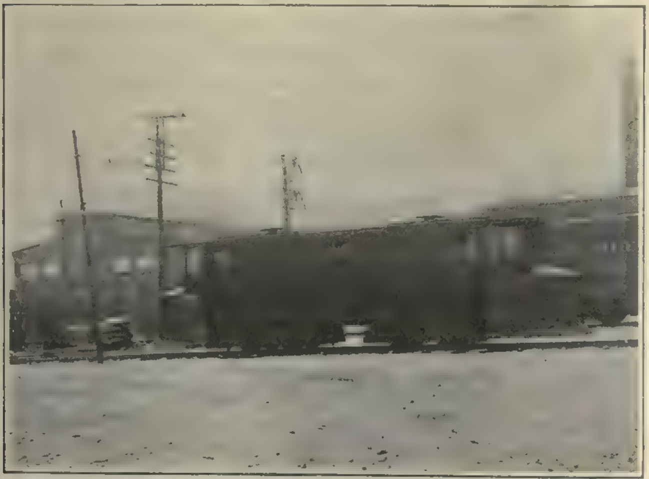
These data further showed that approximately the same percentage of failures occurred with both the interpole and non-interpole motors and with the non-ventilated as well as with the ventilated type of motors. This indicates that an epidemic of motor trouble during unusual weather conditions is no respecter of the manufacturer or of the type of motor construction. It was found that certain properties operating under practically the same conditions had less trouble in general than others, and this was accounted for only by the more thorough preparedness of the former to meet these emergencies.

THESE PRECAUTIONS WILL HELP REDUCE FAILURES

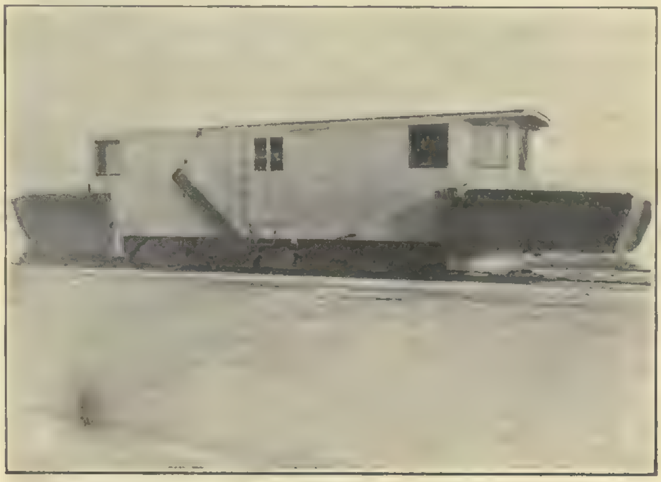
Some of the lessons learned from the investigation mentioned above and from data obtained through other sources of information bearing on this subject and gathered from a number of other railway companies operating in various parts of the country suggest the following points that are worthy of consideration if an effort is to be made to minimize possible trouble due to severe winter operating conditions:

In order to be prepared to handle all manner of equipment trouble it is of vital importance to have an efficient and well-organized body of trained shop men under the supervision of a competent master mechanic.

Regular and frequent inspections should be made at stated intervals of time or on a mileage basis and at least once a year all equipment should be given a



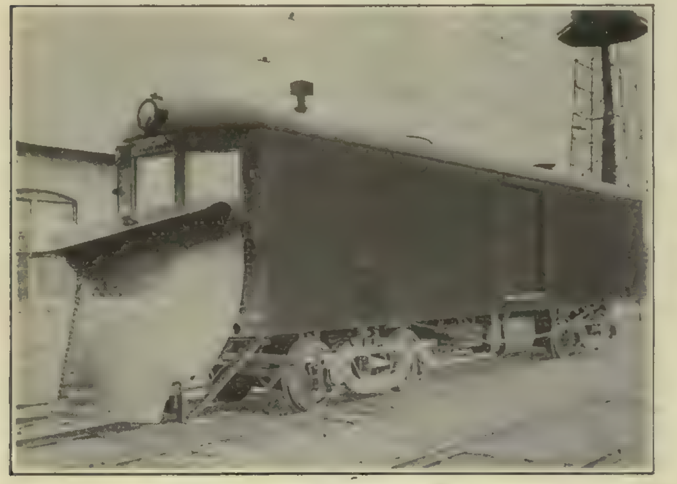
THIS TYPE OF PLOW IS SUITABLE FOR CLEARING SNOW FROM SINGLE TRACKS



THE SHEAR PLOW IS USED ON DOUBLE-TRACK RIGHT OF WAY general overhauling. This will catch partial defects in equipment before they become so serious as to cripple the cars in service and will keep the equipment tuned up to meet any emergency.

Completely wound armature and field coils that have been thoroughly treated by dipping and baking, using a good grade of baking insulating varnish, have been found to withstand the water and moisture encountered during the winter season with less resultant trouble than untreated windings. This treatment has been highly recommended as a means of fortifying windings against grounds and short circuits. In this connection reports submitted in the above investigation by two operating companies which did not dip and bake their armatures show that 58 per cent and 43 per cent of the total number of armatures in service had failed, while two other companies that give their armatures this treatment reported armature failures of only 20 per cent and 14.5 per cent respectively.

All motor leads should be cleated to prevent rubbing and chafing and to insure against grounded or broken leads. Breaks in leads may occur and cars be operated "three-legged" for some time without detection, thus overloading the motors and roasting the insulation. A heavy coating of asphaltum paint protects these leads against snow and water by making them moisture-proof. All unprotected car wiring should be well cleated to prevent rubbing and should be painted with a heavy asphaltum paint to keep out the snow and water.


A PILOT PLOW MAY BE READILY ATTACHED TO ANY INTERURBAN CAR

ABOVE ALL KEEP THE SNOW AND WATER OUT OF THE MOTORS

Suitable tight-fitting solid commutator and hand hole covers should be placed on all non-ventilated motors to prevent snow and wheel wash from getting inside the frame, resulting in damage to the windings and the brush-holders. Armature and axle bearing oil well covers and all dust shields should be made tight fitting and securely fastened to keep water, dirt and snow from getting into the bearing, with resultant bearing trouble. Motors of the ventilated type that ordinarily operate with perforated covers should be provided with solid covers wholly or in part for winter service to keep out the snow and water. The application of solid covers to these motors should, to a large extent, be controlled by local conditions, such as maximum operating temperature of motors and the severity of the winter as judged from the average yearly snowfall. In general, where operating temperatures are as low as 55 deg. to 60 deg. C. rise, solid covers should be applied during the winter months in localities subject to snow. If operating temperatures are high, 75 deg. C. rise, and snowfall is light the regular ventilated covers should be used all the year round. Where snowfall is heavy apply solid covers during the winter months, disregarding the temperatures.

Motor drain holes which are provided in the bottom of the motor frame castings to allow for the proper drainage of water from the inside of the motor quite often become clogged with dirt, snow or ice. During the regular inspection period these holes should be cleaned out and openings cleared.

Gear cases are subjected to bumps and severe strains due to snow and ice between the rails, and for this reason they should be made to clamp securely to the supporting lugs by keeping the clamping bolts drawn up tight and securely locked. The two halves should be carefully fitted together and all covers should be made tight and kept closed to keep out the snow and water.

THE PUSH PLOW IS USED EXTENSIVELY ON INTERURBAN LINES

It is very important that all bolts on motors be kept tight and securely locked to prevent parts from working loose, thus allowing water to enter the motor frame and bearings. These bolts, which should be made of a special heat-treated steel, should be carefully gone over and tightened at each regular inspection.

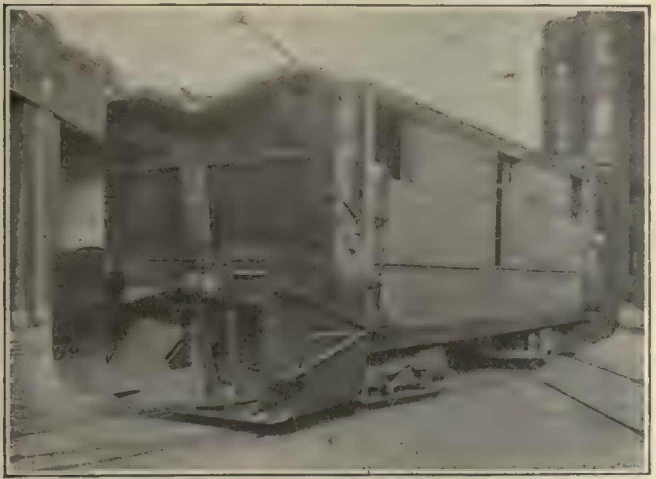
By giving careful attention to the packing and oiling of bearings, using a clean long fiber wool waste and a good grade of winter car oil, bearing trouble will be reduced to a minimum. A further great saving in maintenance and reduction in the number of motor failures can be obtained by a careful and regular gaging of the armature bearing wear, using a feeler gage in the air gap. Bearings that are worn approximately $\frac{1}{16}$ in. should be replaced to prevent the armatures from getting down on the poles and damaging the windings.

The windings and leads of all detail apparatus should be thoroughly painted with a good grade of asphaltum paint and should be provided with suitable tight-fitting covers. Arrange to fit all cars with suitable splash guards, properly located to prevent, so far as possible, the snow and slush lodging on resistance grids, motors, wiring and other parts of equipments.

It has been found by experience that to meet emergencies it is good practice to keep in stock an available supply of spare parts of all apparatus and detail parts. This is especially important at the present time owing to the long delivery dates forced upon the manufacturers on account of the present condition of the labor and material market. It is also well to remember that during the winter season the shipping facilities are not very reliable, and although the material may be available for shipment any promise of delivery cannot be depended upon under existing conditions.

A factor that is too often overlooked is the condition of the inspection pits and carhouses during the winter season. In many cases pits are poorly lighted, wet, dirty and littered with tools and broken repair parts. Many carhouses are not provided with storm doors and are poorly heated, resulting in cold, damp, uncomfortable conditions under which the men are compelled to do their work. These conditions, which exist on a great many railway properties, have a tendency to reduce the efficiency of the workmen, who slight their work and congregate in some corner around a small stove to thaw out and be comfortable.

The organization of a city fire department is considered to be the last word in preparedness for combating fires. It has been suggested that the snow-fighting forces of a street railway company be organized along similar lines. Experienced and reliable crews should be assigned to the different types of snow-fighting equipment operating from the various carhouses and held in readiness so that on a comparatively short notice this equipment can be placed in service to clear the tracks.



A ROTARY PLOW IS NECESSARY FOR HIGH DRIFTS AND OPENS A WIDE ROADWAY

SUMMER CARS CAN BE CONVERTED IN WINTER TO SWEEPERS AT LITTLE COST

Railway operators can learn much from the army strategists, who before any important battle make a careful study of the minutest details of the strength and distribution of the enemy forces in order to determine his vulnerable points. With this information available, together with definite information of their own strength, an attack is planned and executed with clock-like precision. In preparing to fight snow an operating company should make a careful study of the situation and map out a definite program which should take into consideration the following:

1. Available snowfighting equipment.
2. Condition of equipment.
3. Additional spare equipment and parts available.
4. Study of weather conditions.
5. Assignment of crews.
6. Nature and severity of snowfall.
7. Routes to be followed by plows.
8. Time of attack.
9. Provision for emergency and relay crews.
10. Sufficient power supply (consider the use of portable substations).
11. Rearrangement of schedules.

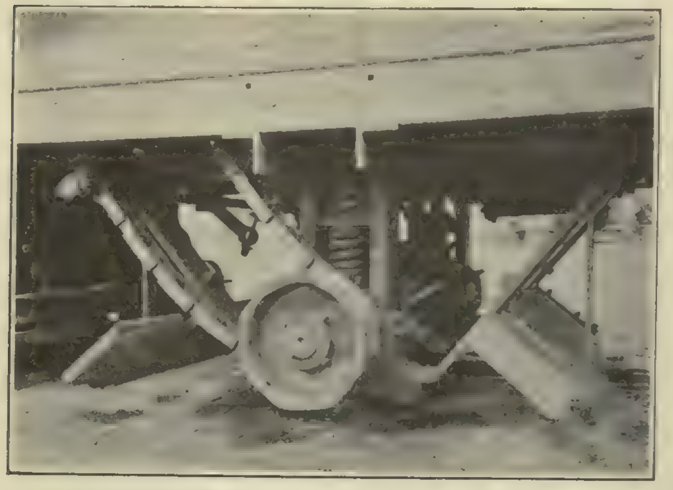
PROPER EQUIPMENT IS MOST IMPORTANT CONSIDERATION

Each individual operating company should figure out its requirements for snow-fighting apparatus based upon past experience. Railway companies with inadequate equipment are compelled to use passenger cars to keep the right-of-way open. Cars that are used in bucking snow may do this work without showing any immediate apparent injury to the motors, but it should be definitely understood that the excessive overheating of the motors by this overloading weakens the insulation of the winding and shortens the life of the equipment. This is especially true in the case of cars equipped with the light-weight ventilated type of motor which has a lower short time overload rating.

The problem of keeping electric railway tracks clear of snow and ice during the winter season has been the means of developing a variety of ingenious devices, some of which have become standard pieces of apparatus and are used quite extensively by all railways. One great fault in connection with this class of apparatus and which is common with too many operators is the use of old and obsolete electrical equipment which is nearly ready for the scrap pile. This results in snow-fighting machines that are not always reliable. Various types of apparatus used to clear the tracks of snow and ice, the details of which are well known to all railway operators, will be touched upon only in a general way.

Snow sweepers consist of either four-wheel or eight-wheel self-propelled cars with a motor-driven broom rotating at an angle on the forward end of the car. This brushes the snow from the tracks and is best adapted for use in light snows and for general work.

Snowplows consist primarily of cars with either four or eight wheels, self-propelled, or pushed, and having on the front end a metal or wooden shaped nose which forces the snow from the track. This kind of apparatus is best suited for deep snows and for suburban and interurban lines. There are various types of snowplows. The nose plow, with the tip or point of the plow coinciding with the center of the track is self-propelled and



AN ICE CUTTER IS A VALUABLE ADDITION TO THE SNOW-FIGHTING EQUIPMENT

forces the snow to both sides of the right-of-way. This type is best suited to clear the snow from single tracks. The shear plow, with the tip or point of the plow offset from the center of the rails, is self-propelled and forces the snow to one side of the right-of-way. This type of plow is most commonly used to clear the snow from double tracks.

The push plow consists of a specially built car having the plow integral with the body of the car. This must be pushed by an external source of power. The pilot plow consists of a sheet metal plow adapted to the front end of any standard type of self-propelled passenger, freight or express car. The rotary plow consists of a self-propelled or an externally driven car with a motor-driven fan mounted at the front end. By means of the centrifugal action of this fan the snow is thrown a considerable distance from the roadbed. This type of plow is best suited for use in high drifts and deep snow.

Other detail apparatus used in fighting ice and snow includes snow scrapers fastened to the cars directly in front of the wheels to clear away the snow and brooms or brushes placed directly in front of wheels to brush away the snow. Then there are also trolley sleet cutters attached to the trolley to clear the sleet from the trolley wire, and third rail sleet cutters attached to the car in front of the third rail shoe to clean the third rail. A chemical solution of calcium chloride may also be squirted on the rail to cut the sleet. Salt is often applied at spring switches to keep these operative, but in cases of a heavy snowfall shovels and brooms must be resorted to in order to keep these switches clear.

The placing of wooden fences along the right-of-way at points subjected to drifts will often prevent the snow from piling up over the roadbed at such points.

ICE CUTTERS ARE ESPECIALLY EFFECTIVE

Since the advent of the low floor car, operating on 24-in. wheels, considerable trouble has been experienced due to snow and ice packed between the rails, thus causing considerable damage to the equipment under the car on account of its small clearance to the roadbed. A very effective device for cutting this ice is illustrated. This consists primarily of a revolving cutter driven at 300 r.p.m. through a double chain drive connected to a 50-hp. motor. The cutter consists of a number of 1 x 5-in. x 5-ft. long standard angles with teeth cut by an oxyacetylene torch. These angles can be removed readily by taking out eight bolts. This cutter is spring supported and can be raised or lowered through a range of 4 in. to adjust itself to the thickness of the ice. The machine is run over the tracks and cuts the ice from between the rails and is followed by a sweeper that clears the chopped ice from the tracks.

Any further detail information regarding this machine can be obtained from J. W. Hulme, superintendent of motive power of the International Railway, Buffalo, N. Y., through whose courtesy this description and these photographs were made available for publication. This apparatus proved so successful last year that two more duplicate machines are being built.

THERE WAS PLENTY OF ACTION FOR ROTARY PLOWS IN NEW ENGLAND LAST WINTER

A similar device has been built by another operating company, but so far its success has not been assured, as the machine has not been given a thorough tryout in service. In general it is similar to the machine as described above except that the cutters used consist of a number of old gears with alternate teeth cut away.

One large operating company whose present equipment consists of forty-two plows and twelve sweepers is planning to add to this equipment for the coming winter. Arrangements have been made to utilize thirty-six double-truck freight cars and orders have been placed for the necessary material to change these over into seventeen sweepers and nineteen snowplows. The work of reconstructing these cars is being done at the shops of the railway company, and the equipment is expected to be ready for service during the coming winter.

An interurban company in the Middle West has taken a number of maintenance-of-way flat cars which will be heavily loaded and the front end fitted with a special pilot plow. These will be utilized as push plows during the winter season with very satisfactory results. This change can readily be made at a comparatively small expenditure of time and money.

An accompanying illustration shows a summer car that has been converted to a snow sweeper for winter service. This scheme also is being used by J. W. Hulme of the International Railway, Buffalo. In an article on this subject by Mr. Hulme in the Jan. 18, 1918, issue of the ELECTRIC RAILWAY JOURNAL he states that the initial cost of installing this sweeper equipment was $900, and conversion at the end of the season can be made for approximately $30.

OTHER CONSIDERATIONS BESIDES REMOVING SNOW FROM TRACKS

In the congested downtown districts of some cities it is necessary to remove the snow entirely from the streets. This work is usually done by shoveling the snow into wagons or cars and hauling it away. In some cities sewers have been utilized to carry away the snow. One novel and efficient scheme used in Boston during the past winter was to use an electrically operated crane, fitted with a grab bucket, to clean the streets of snow. This was described in the ELECTRIC RAILWAY JOURNAL for Feb. 21 and May 1, 1920.

Every railway company operating in the snow belt has experienced during the winter season a considerable demoralization of schedules due to the unusual operating conditions encountered at that time. It has been recommended that in order to meet these unusual conditions schedules be studied and a special snow schedule planned which will give motors sufficient lay-over at terminals during snowstorms to cool off before making the return trip.

A very important consideration which is too often overlooked in connection with the operation of a street railway, especially during the severe winter season, is the necessity of retaining the good will of the traveling public. During these months there are numerous existing conditions beyond the control of the railway company, such as extreme severe weather, poor surface drainage, with resultant flooding of streets and tracks; congested street traffic, stranded automobiles and trucks, abnormal labor conditions and shortage of coal.

These factors tend to disorganize the transportation department and cripple the regular operation of the cars, thus arousing the indignation of the public, which to a large extent is ill-advised or ignorant of the facts. By the expenditure of a little printer's ink in the form of posters, publications or advertisements in the daily newspapers the truth regarding these conditions can be brought forcibly to the attention of the people, and in most cases this will result in securing their co-operation rather than their condemnation.

Securing Observance of Safety Laws*

Effect of Proper Enforcement of Laws and Ordinances Relating to Self-Propelled Vehicles in Reducing Crossing Accidents

BY J. A. VAN OSDOL
General Attorney Union Traction Company of Indiana, Anderson, Ind.

OF THE factors to be dealt with in the problem of crossing accident prevention, the automobile is the conspicuous figure in the foreground. Probably no phase of accident prevention presents greater difficulties than this one because of the diversity of interests encountered and of the fact that practically every law or regulation impresses the individual upon whom it is intended to operate as an encroachment upon his personal liberty. This is especially true when the class to be restrained is composed so largely of persons of immature judgment, or of little or no responsibility. While the grade crossing is not the scene of all of the accidents of this class, it is the place where most of these tragedies are staged, and while they cannot be entirely eliminated so long as we have the crossing at grade, their number can be greatly reduced.

Grade crossings we shall have for years to come, and we must deal with the dangers which these crossings present and endeavor to reduce them to the minimum. Law enforcement is regarded as an efficient means to this end, but law enforcement is more than the mere matter of laws, courts and police officers; those factors are essential parts of our social structure, but they will fail to produce the desired results if left to work out the problem alone. We must bring to their support every agency that is calculated to put behind law enforcement the proper public sentiment.

An investigation made by the Indiana Public Service Commission in 1919 is instructive. The traffic at thirteen public highway crossings over steam roads in as many different parts of Indiana was checked by its inspectors, with a view to observing whether engineers were careless in giving signals, and the manner in which drivers of vehicles approached and passed over these crossings. Here is the result: During the checking 172 trains passed over these crossings, of which 163 gave the proper highway crossing signal. During the same period 1,924 vehicles crossed over these intersections, of which 625 drivers did not look or listen. Of the thirteen crossings checked, five were protected by bells or wigwag signals, which were found in perfect condition. Over those crossings, forty-six vehicles passed over the tracks when the warning signal was operating. The inspectors reported that the drivers of horse-drawn vehicles in most cases looked and listened, but that the automobile drivers as a rule did not look or listen until directly upon the tracks.

From the foregoing it is seen that while approximately 5 per cent of the engineers failed to obey the law at these crossings, 32 per cent of the drivers of vehicles failed to obey. We take it that the result of these tests may be said fairly to indicate the relative failure of duty as between the engineer and the driver of other vehicles. The recklessness of these drivers imperils not merely their own lives, but likewise the lives of the other occupants of the automobile, the train crew and passengers on the train.

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*Abstract of paper read at Ninth Annual Safety Congress, Milwaukee, Wis., Sept. 30, 1920.

If more individual offenders were held responsible in civil damages for the results of their own negligence, the cause of law enforcement would be greatly promoted and the reckless would have more respect for the law. The tendency of juries to set aside the rule of law which forbids one to profit by his own neglect, and the reluctance of some of our courts to interfere with verdicts which are contrary both to the law and the evidence, serves to put a premium on negligence and to bring the law into contempt.

Whether the law to be enforced is some federal or state statute, some municipal ordinance, or the rule prescribed by some commission or by some employer, or merely that particular rule of conduct which has the sanction of experience, public sentiment must back it up if it is to be properly observed or enforced. But these accidents cannot be wholly prevented by any sort of laws or rules which operate only to regulate the conduct of the individual; the personal equation is in this problem and must be taken into account. We cannot absolutely regulate human inclination or human judgment by any set rules, but we can influence them by a course of wise and persistent education. To that end systematic accident prevention should become a part of our national life.

The program adopted to carry on this work of general education must be sufficiently comprehensive to reach all classes and sufficiently practical to arrest the attention of the men of affairs. It must be applied constantly; we must not expect its accomplishment with a single effort. A simple statement shows the problem to be solved: Of the 91,000 lives lost in civil life outside of industry during the nineteen months our country was engaged in the World War, 15,800 of these deaths were caused by automobiles or auto trucks, while during the same period only 47,949 of our soldiers were killed by the enemy.

In 1910 there were 400,000 automobiles and 2,300 deaths; in 1917, 4,941,276 automobiles and 9,000 deaths; in 1919, 7,523,664 automobiles and 10,000 deaths. In 1920, it is estimated we will have 9,500,000 automobiles in use. If the ratio of fatalities for previous years holds good, there will have been 12,600 deaths chargeable to that instrumentality during this year.

The foregoing covers deaths due to automobiles under all circumstances. When, however, we view the automobile and its fatalities as related to railroad grade crossings, the figures published by the Interstate Commerce Commission comparing 1917 and 1918 furnish some comfort. Notwithstanding the fact that while the number of automobiles during that period increased 26 per cent, the total number of automobile accidents at railroad grade crossings increased only 9.5 per cent, the number of persons killed in those accidents but 4.2 per cent and the number injured but 3.6 per cent. These figures indicate that safety work is bearing fruit.

Here are the facts as ascertained recently through inquiry made by the Indiana Public Service Commission of commissions in all of the states, asking for data on crossing accidents, and for experience during the last two years. Of thirty-one states answering, twelve either had no data on the subject or had not yet assembled any. Of the nineteen states which had such data at hand, fourteen reported a decrease and five an increase in crossing accidents. While in some the decrease was but slight, the tendency in that direction in view of the increase in automobiles is interesting and invites investigation.

Texas made an interesting return to the inquiry. Reports from that State show that railroad accidents at highway crossings from Jan. 1 to Dec. 31, 1919, compared with the corresponding period in 1918 decreased 20 per cent, and that deaths resulting from such accidents decreased 53 per cent. For the same period Michigan showed a decrease of 29 per cent in number of crossing accidents, and a decrease of 18 per cent in deaths from that cause. Ohio for the same period reports a decrease of 17 per cent in deaths from such accidents.

Thus far the effort to reduce accidents has been exerted in the urban centers, but before we can bring all the people to the proper appreciation of this work, and before we can expect a healthy public sentiment so general as to insure law enforcement, the rural side of the problem must receive attention. That is a field practically untouched up to this time, and while results there must not be looked for so quickly as in some industries where instruction, inspection and supervision in safety work are matters of daily routine, rural life stands ready to respond with community effort whenever it can be made to see the need of it.

Of all the channels selected through which it is now planned to reach the general public and induce it to take up this cause as a community effort, nothing offers more promise than that of the public schools. No more effective means exists for getting safety incorporated into the community life than to first get it incorporated into every school curriculum.

British Figures Regarding Tramway Transportation Made Public

ACCORDING to data just made public by the Ministry of Transport, the length of the tramway route open for public traffic in the United Kingdom has increased from 269 miles in 1878 to 2,728 miles in 1918-19. Of these 2,728 miles, 1,713 miles were owned and operated by local authorities and 146 miles were owned by local authorities but were operated by companies.

Compared with the last completed year prior to the war (1913-14) the total number of passengers carried has risen from 3,426,473,192 to 4,557,640,078 in 1918-19, an increase of 1,131,166,886, or 33 per cent. In the same period the number of car-miles run has decreased from 354,379,672 to 320,378,376, with the result that the average number of passengers per car-mile is now 14.2, as compared with 9.7 in the year 1913-14. This is an increase of 46 per cent.

The number of journeys per head of the estimated civil population works out at 108, as compared with 74 in the year 1913-14, while the number of passengers carried per mile of route open was 1,668,122, an increase of 400,387, or 31.6 per cent on the pre-war figure.

The number of local authorities who have obtained authority to install trackless trolley undertakings is twenty-six, but of these only seven actually operated lines. Five companies have also obtained powers, of which only one was operated during 1918.

Mechanical Department Stores Accounting*

An Airtight System of Stores Accounting Based on Efficient Administration of Standard Practice with Addition of Special Provision to Guard Against Leaks and Losses—Cost Accounting Is Also Handled by Storekeeper

BY THOMAS KENNEDY
Storekeeper Tri-City Railway & Light Company, Davenport, Iowa

STORES accounting is a subject that has been treated on but lightly, when we consider the numerous papers and books written on almost every other phase of accounting, organization and efficiency. It would seem that this topic was unimportant, merely a subject covering a minor routine and to be passed over lightly, and that same could be adjusted or corrected without the outlay of much time or thought.

All those interested in this subject should take the time to investigate the stores accounting systems of some of the large industrial corporations, the steel companies, railroads, etc., and they would soon learn that these companies insist that the routine of receiving and distributing of material and supplies be strictly adhered to and the accounting for them is as necessary to the economical operation of the business concerned as it is to see that the cash account is properly balanced.

There is not one among you who, if the storeroom bins and shelves were filled with dimes, quarters, dollars, etc., would allow the heart-breaking freedom of access and loose methods in the storeroom that you do at the present time. Yet that is what it amounts to. The bolts, batteries, bells, bearings, buckles, bushings that are stacked in your storeroom bins are in reality so many real dimes, quarters, half dollars, dollars, etc. Bins of them! Some full—some half full! The storekeeper and stores accountant must war continually against *carelessness, ignorance* and, without a doubt, against *downright thievery and dishonesty.*

It requires a man of rare intelligence and good judgment successfully to operate a stores system. He must be able to master a mass of detail and be a fighter for the system in the interests of the company. Do not be surprised or discouraged if you find that it takes time to develop the man you want. It has been my experience in the storerooms of the Tri-City Railway that a man is not of much value under two years of service.

There are no accepted standards to follow in installing a stores accounting system, as the details in some cases are always subject to local conditions of storeroom equipment, as well as the nature of the reports required by the accounting department.

I will endeavor to explain to you our method of handling stores material from the time it is requisitioned until final disposition is made of the stored material.

When any material is required for the operating, mechanical or construction departments, a requisition is made out on the purchasing department, either by the storekeeper or the foreman of the above departments. The storekeeper is furnished with a copy of all orders for material purchased by the purchasing agent, regardless of whether the material was requisitioned by the storekeeper or by one of the superintendents or foremen. A yellow copy indicates to the storekeeper that it covers material requisitioned by himself, and a green copy indicates that it was requisitioned by some other party. One copy of the order is also sent to the party making out the requisition. The requisition form has a "Do not fill in or use this space" column for the notations of the purchasing agent to his clerks as to where to get quotations.

The purchase orders, issued from these requisitions, are made out in sets of three, a quadruplicate being used in rare cases, such as when material is requisitioned by others than the storekeeper, the usual use being made of the three. The copies of the purchase orders received by the storekeeper are listed alphabetically in the order record book and a chain index used which enables him to get at any order on any company very readily. They are then filed in a binder, numerically, to await the receipt of the material.

MATERIAL RECEIVED CAREFULLY ACCOUNTED FOR

When material is received by the storekeeper, he makes up a record of same on a loose leaf blank which gives a complete record of the order number on which it was purchased, from whom, the size or catalog number of the article, the article itself, the railroad or express company delivering same, with the railroad freight bill number, if by freight, amount of same and drayage, quantity, gross cost of same after deducting discount, net cost after adding freight, account to which this material is to be charged, folio number of the stock book to which these articles are afterward posted, as well as the voucher number which covers payment for the same. These sheets are made daily and are numbered consecutively from one up. All material received is listed on these sheets the day it comes in and the page number of this book is marked on his copy of the order. The order is then transferred from the open file to the closed file, if all the material is received. If only a part of the order is received the order remains in the open file until final completion. A similar form is used when material is delivered to branch storerooms, the original being sent to the main store room.

On receipt of material it is checked with the copy of the order. This copy also tells which account is to be charged with this material and this information is filled in under the heading "Charged direct to."

Very definite instructions are issued to cover receipt of material, checking, identifying shipments, handling short or damaged shipments, and unpacking.

The next step is the approval of the invoice for same. All invoices, after having been approved for price by the purchasing department, are forwarded to the storekeeper for check and receipt. If the material is to be in one of the stores accounts he so indicates on the invoice, or if it is to be charged to some operating or maintenance account, he so indicates on the invoice. In either case he is guided by the charge appearing on the receiving sheet under the heading "Charged direct to," which he entered there on receiving the material. The invoices are then forwarded to the accounting department.

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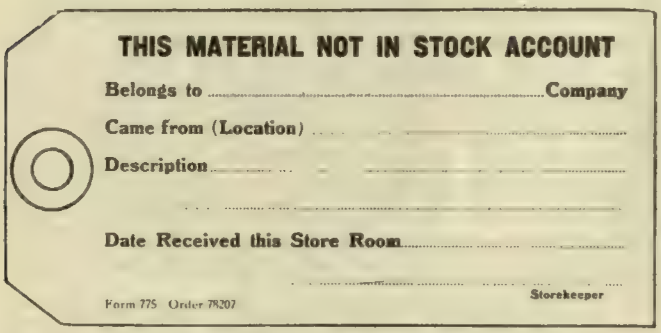
*Abstract of paper presented before Iowa Electric Railway Association, Omaha, Neb., Sept. 16, 1920.

The material in the meantime, having been properly checked for quantity and quality, is stored in its proper bin or racks provided for same, and on which appears a blue label, shown in an accompanying illustration. For wire and other material not placed in bins, tags, as shown, are used.

All material received during the month is posted from the receiving book to the stock ledger sheets. These sheets have spaces on the heading for location of storeroom, bin number, folio, catalog number, name of article and unit of measure. The body is divided into three parts, the left hand side being a record of all receipts of this article and the right hand side for the record of all disbursements, a small space at the extreme right being used for the balance on hand, which is brought down every month for comparison with the general books. There are two checking columns, one on the "receipt" side and one on the "disbursement" side. All entries on either side are rechecked, for they must be correct.


THIS MATERIAL NOT IN STOCK ACCOUNT

Belongs to .... **Company**

Came from (Location) ....

Description ....

....

Date Received this Store Room ....

....
Storekeeper

Form 775 Order 78207

RED "NOT STORES" TAG TO MARK MATERIAL NOT CHARGED TO STORES ACCOUNT

The method used to check what has been vouchered is for the accounting department to send to the storekeeper a transcript of his stores accounts for that month.

It is the policy of our company that all construction work must be duly authorized before same is started. To facilitate matters of this kind we have filled out and properly signed what is known as a proposed expenditure blank. After this has been approved by the general manager and executive board it is proper for work to be done and charges put through against construction accounts bearing this "P. E." number, in addition to its regular number under P. C. C. classification. Charges to operation and maintenance accounts come under the same classification.

When issuing material from the storeroom, a storeroom requisition must be signed for all material issued regardless of who it is that is taking the material from the storeroom. Storekeepers must not sign storeroom requisitions for any one. Requisitions used by branch storerooms in requisitioning material from main storeroom are identical in form but of larger size. These requisitions are forwarded to the storeroom office, where they are posted daily on monthly summary sheets provided for this purpose and headed with spaces for the following information: Month; account number; credit, which applies to the particular stores account which is to receive credit for the material issued; location of storeroom and clerk who enters same in stock record and approval of purchasing agent, who in our company is in direct charge of all storerooms. The folio number of stock sheet is also shown, as is the name of article issued.

The balance of the sheet is divided off for the number of days in the month. In our case, as the storeroom month runs from the 21st to the 20th, these sheets begin with the 21st, as this is on the first day of the storeroom month. To these sheets are posted daily all material issued. As the storeroom requisitions are numbered consecutively as passed, this number is carried also on the entry.

At the close of the month, these charges are totaled and priced, then entered in the stores ledger on the disbursement side of the stock ledger sheet. The totals of the monthly summary sheets constitute the charges to the accounts indicated for the month and the storekeeper's report is made from these sheets.

SOME OF THE AIRTIGHT PROVISIONS

The foregoing is a complete record of our method of distributing and accounting for materials. If that covered an efficient storekeeper's duties, you could in all probability train a man in six or eight months' time. But please let us pause here and consider that mass of detail, mentioned early in this paper, and which will cover: Credit memorandums, gasoline receipts, inventory tickets, inventory sheets, "not stores" tags, material returned reports, oil reports, brake shoe reports, monthly junk statements, wheel reports, shop orders.

> Foremen are required to turn in daily scrap material accumulated in their departments, when it is practical to do so, but it must be turned over to storekeeper at least once a month. Scrap material should not be allowed to accumulate, except, in the storeroom until such time as it is sold by the proper party. In delivering scrap material to the storekeeper please advise the storekeeper the account or authorization number which is to receive credit.

For this purpose and also for crediting back material taken out of service and which can be reclaimed and put back in service, we use the credit form shown herewith, to credit the operating or construction accounts and charge "stores." These are made up in book form with original and duplicate. The original is perforated and is sent to the storekeeper by the foreman making out the credit, the duplicate remaining in the book for his record.

All the gasoline used in the operation of our automobiles and trucks is purchased from the filling stations. Our form for keeping a record of the same is shown in an illustration. These are made up in small bound books of fifty sets each. They are then issued to the operators of the automobiles and trucks by the storekeeper, and a record of the book numbers kept by him. From the pink duplicate copies of these receipts sent to him the storekeeper O. K.'s all invoices for gasoline.

Inventory tickets are made out in advance of an inventory period and the names of articles, bin number and folio number are taken from the stock ledger sheets. They are then distributed to the proper bins and count of same is taken on these tickets. At the close of inventory period, they are gathered up and after making the allowances noted for material received or given out since counted the net figure is transferred to inventory columns of the inventory sheets, which carry the usual information. The sheets can be used for two successive inventory periods.

A "not stores" tag, reproduced herewith, is attached to all material which is in the storeroom but for some reason is not charged to any stores account. It may have been charged to some special account on receipt, or it may be discarded material that can be used for some other purpose.

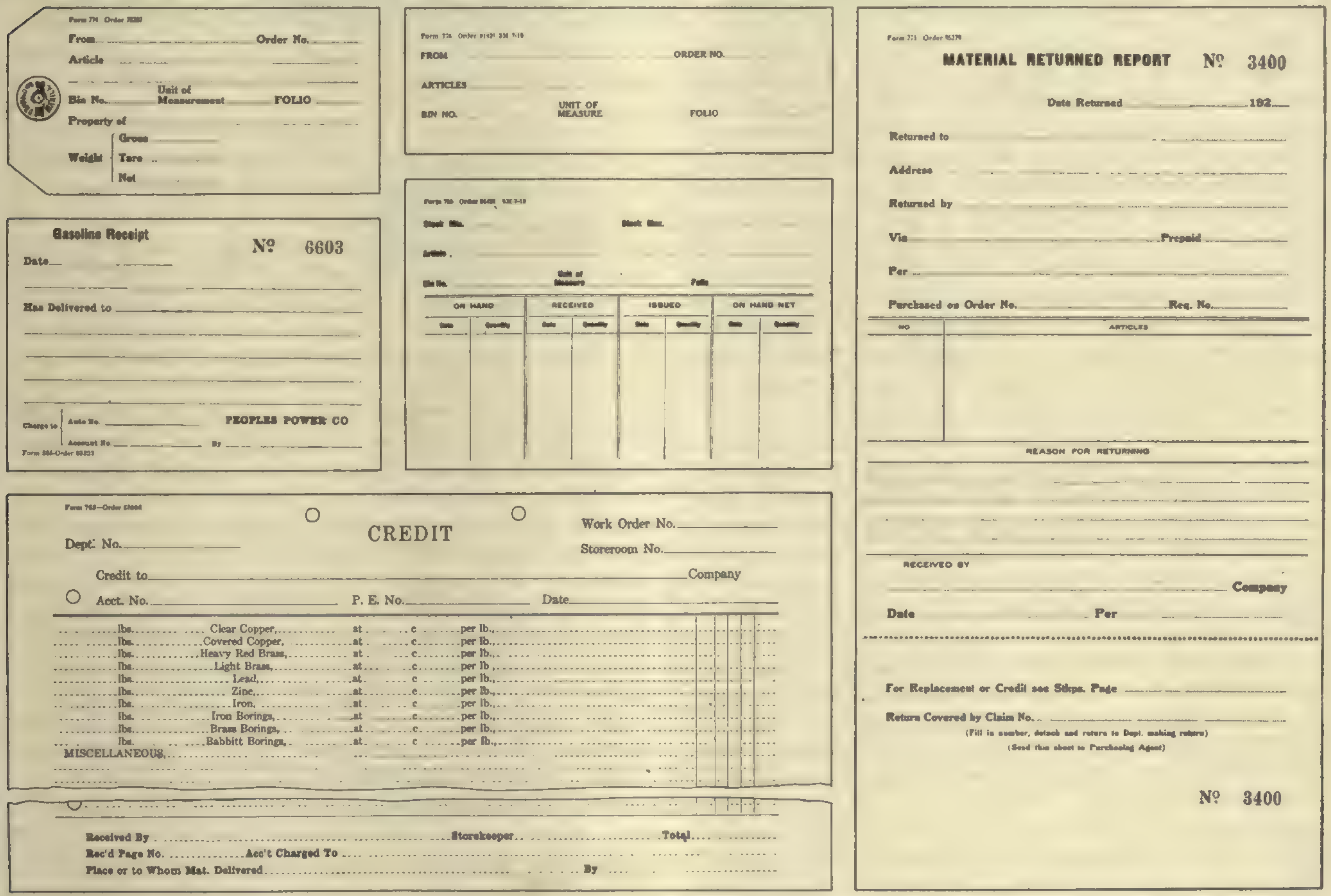
Another form is used when returning materials to dealers or manufacturers for credit, replacement, repairs or otherwise. If the material is to be repaired at the expense of our company, a purchase requisition is also sent to cover same. These reports are made up in books of 50 sets each. The original is green in color and the duplicate is pink and both are perforated. The triplicate is yellow in color and remains in the book. These forms are filled out by the storekeeper and sent to the purchasing agent to start a claim.

You will note the lower part of the original is perforated, and number of this report is also printed there. This is for the use of the purchasing agent's clerk, who fills in the number of the claim and returns it to the storekeeper, who enters the claim number on his yellow triplicate copy in the book. When material is returned or credit received he notifies the purchasing department to close this claim.

More and more, good storekeeping really develops into cost accounting, and when you talk of cost—let us stop and consider that word and what it means. In modern industrial organizations there is no item of greater importance than cost. To know your cost is to thoroughly know your business. Cost accounts should be regarded as detailed statements of the condensed statements shown in the general accounts. They should give in detail the causes which produce certain totals, and will enable the manager to reason intelligently regarding these totals. A good cost system is impossible without a good storeroom and good storeroom accounting methods.

We were called on in the storeroom of the Tri-City Railway for the material cost of numerous classes of work done in the shops. It might have been the cost of repairing wrecked car number 452 or of painting auto number 19. To consolidate all the charges at one point, to get the information wanted when it was wanted, we instituted our present shop orders. To begin with, I wish to say that up to this time we had no method of knowing the total cost of any of the jobs and what information had to be got was taken care of by the storekeeper in special reports. While this deals with only the direct materials and direct labor, nothing being done with such items as rent, heat, light, depreciation, insurance, taxes, etc., it answers the purpose for which it was intended, namely: To give the total amounts of the above-mentioned direct labor and material for any particular piece of work. The balance of the miscellaneous charges can be distributed under a percentage plan. Since all the methods of distributing expense establish a relation between expense and some feature of material and labor, a close appreciation of the expense necessary for a given piece of work can usually be made when this basic factor is known.

The three principal uses of a cost system are: First, to show the actual cost of operations. Second, to form



Form 774 Order [illegible]
From Order No.
Article
Bin No. Unit of Measurement FOLIO
Property of
Weight Gross
Tare
Net

Form 776 Order [illegible]
FROM ORDER NO.
ARTICLES
BIN NO. UNIT OF MEASURE FOLIO

Form 771 Order [illegible]
MATERIAL RETURNED REPORT Nº 3400
Date Returned 192
Returned to
Address
Returned by
Via Prepaid
Per
Purchased on Order No. Req. No.

NO	ARTICLES

REASON FOR RETURNING

RECEIVED BY
Company
Date Per

For Replacement or Credit see Stkps. Page
Return Covered by Claim No.
(Fill in number, detach and return to Dept. making return)
(Send this sheet to Purchasing Agent)

Nº 3400

Gasoline Receipt Nº 6603
Date
Has Delivered to
Charge to Auto No. PEOPLES POWER CO
Account No. By
Form [illegible]-Order [illegible]

Form 7[illegible] Order [illegible]
Stock Min. Stock Max.
Article
Bin No. Unit of Measure Folio

ON HAND		RECEIVED		ISSUED		ON HAND NET	
Date	Quantity	Date	Quantity	Date	Quantity	Date	Quantity

Form 76[illegible]—Order [illegible]
○ CREDIT ○
Dept. No.
Work Order No.
Storeroom No.
Credit to Company
○ Acct. No. P. E. No. Date
lbs. Clear Copper, at c per lb.,
lbs. Covered Copper, at c per lb.,
lbs. Heavy Red Brass, at c per lb.,
lbs. Light Brass, at c per lb.,
lbs. Lead, at c per lb.,
lbs. Zinc, at c per lb.,
lbs. Iron, at c per lb.,
lbs. Iron Borings, at c per lb.,
lbs. Brass Borings, at c per lb.,
lbs. Babbitt Borings, at c per lb.,
MISCELLANEOUS,
Received By Storekeeper Total
Rec'd Page No. Acc't Charged To
Place or to Whom Mat. Delivered By

SOME OF THE INTERESTING FORMS USED BY TRI-CITY RAILWAY & LIGHT COMPANY IN STORES ACCOUNTING

Upper left, blue tag for material not in bins. Upper center, blue card for bin label. Center left, gasoline receipt blank. Center, inventory ticket, partly made out before inventory period. Lower left, credit form for periodical return of material taken out of service. Right, material returned report made out by storekeeper.

the basis of managerial reports. Third, to predict future operations.

No one method of cost finding can be laid down that will answer the requirements of every situation. Our case was studied independently and a system arrived at that would be applicable to the problems we had at the Tri-City Railway. And it has opened our eyes to a good many things. For instance, we found we could not paint automobiles as cheaply as we could have them painted outside. We found men charging time promiscuously, to any maintenance account or wrecked car that was in the shop at that time. We found we could buy steel bushings cheaper than they could be made. We found that it was more expensive to wind and rewind field coils ourselves than it was to have the work done on the outside.

It is necessary to give detailed instructions for the handling of shop orders in order that the benefits of the cost accounting be realized. They are issued in triplicate, by the storekeeper, one copy going to the man in charge of the work, one going to the timekeeper and the third remaining in the book. The order indicates by whom it is issued and at whose request, to whom it is issued and the work to be done. An important item in our organization is to have noted, for intercompany accounting, the company to whom the work shall be charged. There is a shop order card for each shop order, and on this card all charges, for both labor and material, to this shop order are entered, as work progresses, so that at any time the total expenditure on this order is known. When the work is completed, the original order is returned to the storekeeper and the account of that order may be closed.

You will, no doubt, agree with me that you cannot attach too much importance to the value of a competent storekeeper and a good stores accounting system. They are, in my opinion, the life of the organization—to a certainty, they are the clearing house between the accounting, mechanical, operating and construction departments. Some of our members may think the system as outlined above may seem to be overburdened or to contain too much of the renowned "red tape." It seems to the writer that it is a common opinion that the storeroom is of little importance and that it is only necessary to have in charge of a storeroom a good strong man to open boxes and wrestle car wheels, with the usual characteristics of honesty. This, in my opinion, is a very serious mistake, as we have found from experience that brains are more necessary in a storeroom than brawn.

If you are going to have a storeroom and a stores accounting system and maintain them as such, it is necessary to have one in charge who thoroughly understands the accounting system of the company, and who is capable of properly classifying his charges from stores. An inefficient system can cause great inconvenience to the public as well as a great financial loss to the company in not having running repairs on hand so as to keep the cars in service at all times. It is much better to have the stock on hand than to have the cars tied up in the carhouse. And since the coming into existence of state commissions, it is imperative that you be prepared to furnish details of all operation and construction charges which your property shows.

Another feature is your ability at any time to determine the value of your stores, and this is especially true where the accounts of a company are examined by public accountants, who not only have to be shown that you have the material on hand as represented by your stock ledgers, but also that the charges made against construction and operation have been properly classified. It is a rare instance indeed when a good stores system will not pay good dividends and adequate returns.

STOREROOM-RECORD ECONOMIES DISCUSSED

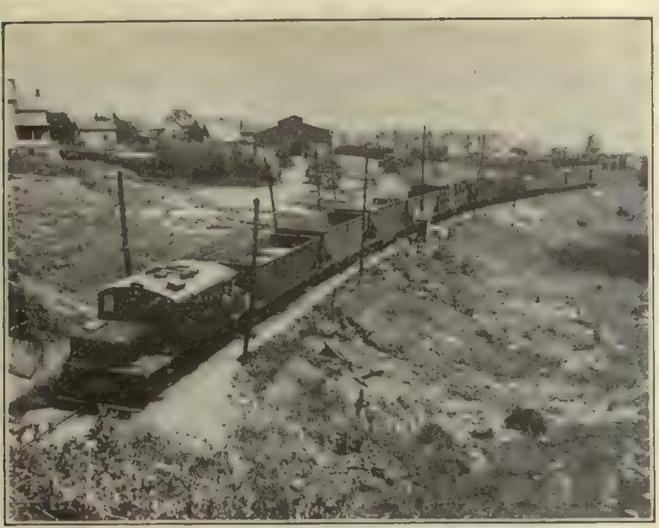
There was a rather long discussion of Mr. Kennedy's paper on storekeeping, the main thought at issue being whether or not an "airtight" storekeeping system was justifiable, comparing the savings to be realized with the cost. Mr. Kennedy summed up the results obtained in Davenport by adhering to the practice of a closed storeroom and a careful accounting of all materials and supplies by saying that prior to the adoption of the present system the stores accounts would come out $3,000 or $4,000 a month over or short, whereas the discrepancy now seldom runs over $200 or $300. He commented that there was absolutely no such thing as an exact balance in storekeeping accounts, for the cost of keeping such a close account of the very small things such as screws, nuts, etc., would be prohibitive.

R. H. Findley, Omaha, asked about the cost of the storeroom department in Davenport, in connection with the railway shops, and was informed by Mr. Kennedy that he employed only three clerks and two men to do the heavy work and issue and receive materials. He contended that this was all work which had to be done, and that if it was not done in the storeroom it would have to be done in the general office, so that the maintenance of a careful storeroom accounting system did not increase the company expense particularly.

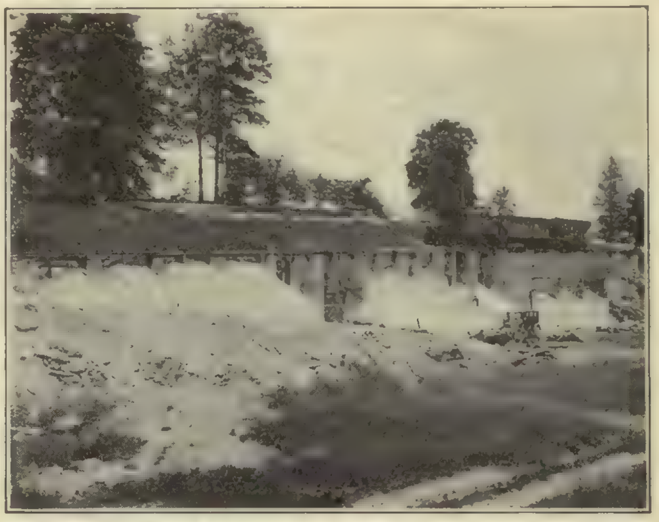
W. G. Lamb, Waterloo, Iowa, explained how a control over the storeroom issues was maintained on his property. After material is issued from the storeroom, all requisitions are forwarded to the general foreman of the shops, who glances over them in odd times and initials them before returning them to the stockroom. If he notes any undue requisition of material, he immediately checks up on it. Then in the problem of keeping down the stock of reclaimed equipment, Mr. Lamb said that whenever he noted an overstock of such used parts as nuts, bolts, trolley bases, trolley poles, etc., he puts a stop order on the issue of any of these things being issued from the new stock until the reclaimed ones are used up. This forces the repairing of the old parts and keeps the stock and investment in new parts down.

Mr. Kennedy was asked about his ability to keep up his maximum and minimum records on supplies. He replied that there had been so much trouble in securing materials in the last few years that the maximum and minimum records had been practically discarded. Presumably these records will go back into use again when the condition of the market becomes more nearly normal. The author was also asked about the manner in which the company disposed of junk. He explained that it was sold to the highest bidder each month. Mr. Keith, Des Moines, said that his company sold junk to one man in order to make identification of brass and copper more readily possible. Des Moines junk dealers are required to report to the city within twenty-four hours any copper and brass junk purchased. If the railway company sells to various junk dealers it is very difficult to check up on these city reports, a copy of which is immediately forwarded to the local railway company.

Mr. Kennedy said that this had formerly been the practice in Davenport, but it had been found that the junk dealer thus favored had not given the company as good prices as it should have received.



ONE OF THE YOUNGSTOWN & SUBURBAN ELECTRIC LOCOMOTIVES SHOVING A TRAIN OF EMPTIES ONTO THE PENNSYLVANIA RAILROAD TRANSFER



A 540-FT. TIPPLE OF 3,000 NET TONS CAPACITY UNDER CONSTRUCTION ON YOUNGSTOWN & SUBURBAN ELECTRIC LINE

Co-operating with Local Industries for Freight Business

Youngstown & Suburban Railway, Built as Passenger Line, Plays Important Part in Providing Freight Service to Industries Along Line

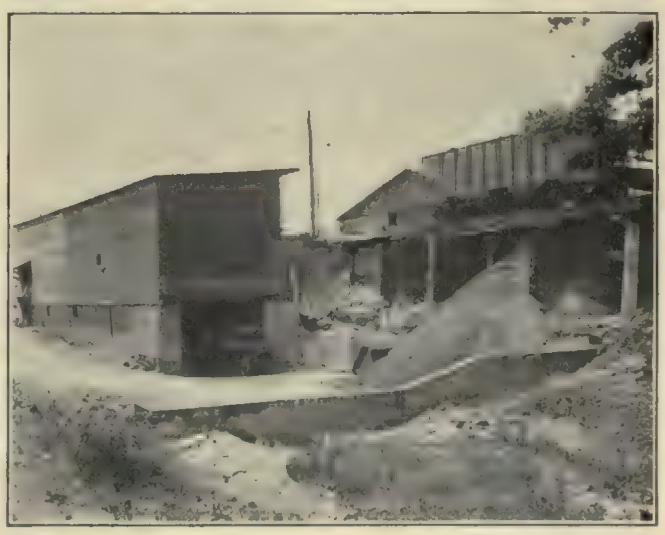
THE accompanying three views give some idea of the manner in which the Youngstown & Suburban Railway, Youngstown, Ohio, is tying up with the local industries along its line to serve their requirements for handling freight. Until a few years ago practically the entire attention of the officials of the road was devoted to passenger traffic, but the development of freight service on this 40-mile line in the last few years has increased to such proportions that today it requires almost the undivided attention of the management.

The line serves a thickly populated territory with numerous industrial plants, oil wells and coal mines along its line. One of the principal sources of revenue to the company has been in the handling of coal and building materials. This has been greatly facilitated and the continued patronage of customers assured through the building, by the customers, of unloading tipples served only by the electric line. Interchange facilities with the steam roads have made this exclusive service possible.

One of the three photographs reproduced herewith shows the tipple constructed on the electric line by a large Youngstown coal dealer. This tipple has a capacity of approximately 800 tons of coal. Slag, sand, cement, etc., are unloaded in the shed shown at the left. Brick, tile and the like are unloaded on the opposite side of the tipple. This company also has several large warehouses which are located on the opposite side of this tipple, one of which can be seen in the picture referred to.

The other tipple pictured herewith is under construction at the present time and is said to be one of the largest of its kind ever built on an electric railroad. This is being built on the electric line by a contracting firm which is spending about $40,000 in the construction of this tipple and in adjacent warehouses, etc. The total trackage of the tipple shown herewith, when completed, will be more than 1,000 ft. and the tipple itself will be 540 ft. long and have a capacity of 3,000 net tons. The grade from the bridge to the near end of the tipple is 3 per cent, with no grade on the part yet to be completed. A solid concrete wall is to be built along one side of the concrete piers supporting the track. Parallel to this wall there will be a macadam driveway, from which wagons and trucks can be loaded from the chutes with which the bins will be equipped. With these facilities a carload of material can be unloaded in five minutes or less and a 5-ton truck can be loaded in two or three minutes. At one side of this tipple there will be constructed sheds and stables with a capacity of thirty-five trucks and wagons and about fifteen head of horses. On the opposite side of the tipple several warehouses are to be built. This same contracting company is to construct adjacent to the tipple a track 1,100 ft. long with a clearance of 900 ft. for use exclusively in unloading brick, tile, sewer pipe, etc.

The Youngstown & Suburban Railway claims to operate entirely on a steam road basis and to be equipped to handle any amount of carload freight. The accompanying photographs illustrate how local industries may be induced to co-operate with electric lines, to the mutual advantage of both parties, in the problem of securing prompt transportation of materials and supplies.



RECEIVING TIPPLE OF YOUNGSTOWN COAL AND BUILDING MATERIALS DEALER SERVED BY ELECTRIC LINE

Railway Situation in Italy

THAT the critical shortage of coal in Italy is having a material effect upon railway development in Italy is shown in a report to the United States Department of Commerce by Trade Commissioner H. C. MacLean, Rome, Italy. He points out that efficient operation of any transportation system is dependent upon the adequacy and condition of its mechanical equipment, a sufficient supply of fuel and a disciplined personnel. Italy is at a disadvantage with respect to all three of these factors. At no time since the end of the war has the supply of coal in Italy exceeded more than about one-half the quantity normally consumed and the Italian railroads have been obliged to eke out their scanty allotment by employing unsatisfactory substitutes.

When the principal railway systems of Italy were taken over by the government on July 1, 1905, and became the Italian State Railways, their length was about 6,961 miles, while the length of the roads which continued under private management was about 1,924 miles, a total of 8,885 miles. At present the State Railways have a mileage in excess of 9,920 and the private roads 3,845, a total of 13,765.

The keen interest of the Italian government in providing for the rehabilitation of the railways and their expansion is clearly demonstrated by the action taken immediately after the signing of the armistice. Provision was made for the transition period between war and peace by the authorizing of an expenditure of 1,800,000,000 lire (lira at par of exchange = $0.193 American money) for railway work and renewal of railway material. Much work is subsidized by the government and subsidies are allowed to private companies of from 5,000 to 15,000 lire per kilometer; 2,000 lire extra where electric operation is specified. Subsidies are also given for the electrification of existing lines.

Mr. MacLean gives the following data regarding lines under construction which will be operated by electric motive power: Domodossola-Confine, 21 miles, 66 per cent of entire line completed; Modena-Lama-Mocogno, 37 miles, about 30 per cent of roadbed and buildings completed; Spoleto-Norcia-Piediripa, 34 miles, 45 per cent of 19 miles and 2 per cent of 15 miles completed; Rome-Ostia, 18 miles, commenced; Pracchia-San Marcello, 10 miles, commenced. In all, private companies have under construction about 366 miles of new railroad, about 245 miles of which will be steam traction and the remaining 121 miles electric traction.

Other work which will probably be started in the near future covers a mileage of 281, of which 135 miles will be steam and 146 miles electric. The electric lines are Genova-Casella, 14 miles; Rome-Civitacastellana, 63 miles; Civitavecchia-Orte, 53 miles; Intra-Premeno, 9 miles; S. Giovanni Bianco-Piazza Brembana, 6 miles.

Cloudburst Expensive for Rail-Light

THE Toledo Railways & Light Company suffered heavily as a result of a cloudburst which occurred in Toledo and vicinity on Aug. 16. The severity of the storm can be inferred from the fact that 4.28 in. of water fell in one hour. The accompanying illustrations are from photographs taken at important points on the electric railway system and indicate the temporary operating difficulties which were encountered. At one low point the water was over 6 ft. deep, and the water fell so rapidly and with such force that at several points the creosoted wood paving blocks were floated out of place.

A total of 150 cars were crippled through the water-soaking of the field coils and armatures, and the shops have been hard put to it to get them dried out and otherwise rehabilitated.

In some ways the railway company was more fortunate than the city in that the rails and ties held the paving securely in the strip paved by the railway.

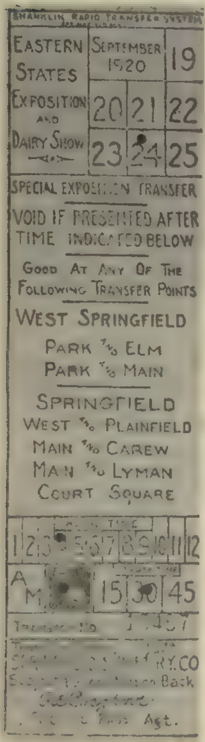
DIFFICULT OPERATING CONDITIONS FOR THE TOLEDO RAILWAYS & LIGHT COMPANY

A "Foot Punched" Transfer

New Machine Issues Transfer Without Demanding Use of Both Hands of Platform Men—Applicable to One-Man Cars

THE Shanklin rapid transfer machine, manufactured by the Shanklin Equipment Company of Springfield, Mass., represents a new and unique development in street railway apparatus. This machine issues a transfer punched and ready for the passenger to use, without the aid of any clockwork mechanism and with the use of only the foot of the conductor, after the "combination" is set.

The machine consists of a box mounted on a pedestal which has a foot lever at its base. The box is readily removed from the pedestal, weighs about 20 lb., is about 18 in. long, 12 in. deep and 6 in. wide. It is made of sheet metal and contains a strip of 500 transfers, a punch plate and an operating mechanism for feeding the transfers, properly punched, to the passengers.



SHANKLIN RAPID TRANSFER SYSTEM

EASTERN STATES EXPOSITION AND DAIRY SHOW	SEPTEMBER 1920		19
	20	21	22
	23	24	25

SPECIAL EXPOSITION TRANSFER

VOID IF PRESENTED AFTER TIME INDICATED BELOW

GOOD AT ANY OF THE FOLLOWING TRANSFER POINTS

WEST SPRINGFIELD
PARK TO ELM
PARK TO MAIN

SPRINGFIELD
WEST TO PLAINFIELD
MAIN TO CAREW
MAIN TO LYMAN
COURT SQUARE

AM 15 30 45

SPECIAL EXPOSITION TRANSFER ISSUED BY MACHINE AT PREPAYMENT LOADING POINT, SPRINGFIELD FAIR GROUNDS

The pedestal is of cast iron with a diameter of about 3 in. and a height of 3 ft. The foot lever at the base operates a rod, which in turn operates the punch plate and also a ratchet-and-pall device, which feeds the transfer to the outlet. A push downward is all that is required after the initial adjustments are made. The rear portion of the box opens for the insertion of the lapped strip of 500 transfers in a receptacle, after which the first transfer is placed in the die plate and the door closed.

On the left-hand side of the box is a movable sector of a circle which has segments marked AM, PM, 15, 30 and 45. This is used to set for AM or PM and any fifteen-minute interval of an hour. On the right-hand side is a similar sector of a circle which has numbers from 1 to 12 on the segments. This is used to adjust for the hour desired. These two sectors thus allow the time to be set to within fifteen minutes of the time desired at the next transfer point.

On the top of the box a set of push buttons is located and also a window which shows the counter dial for recording the number of transfers issued. The push buttons are labelled with the different routes, emergency, inbound and outbound. By means of the push buttons the conductor can punch the transfer for any route desired.

As an example, assume the next transfer point on an inbound car at 4 p.m. is at 4:15 p.m. on the run schedule. The sectors on the sides would be adjusted to 4:15 p.m. and the inbound push button would be pushed down. If the route to which transfers are desired is "Pine Street," then its push button is also operated. The conductor then simply pushes the foot lever as each passenger asks for a transfer and the properly punched transfer issues at the mouth of the box for the passenger to grasp.

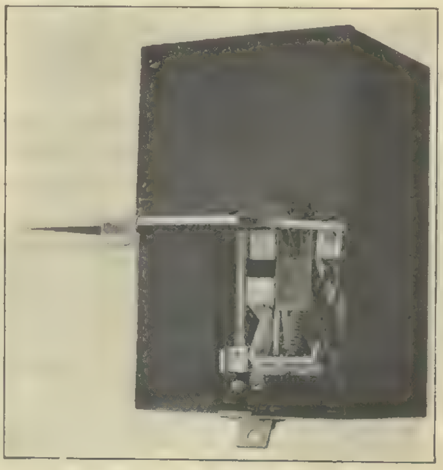
The internal mechanism is simply a pressed steel die plate and a punch plate containing hardened steel punch slugs. The punch plate is on springs and the operation of the foot lever pushes it up against the die plate and causes the punch slugs to penetrate the transfer at the open holes in the die plate.

The die plates are removable, so that any plate corresponding to a given group of routes can be installed in the box. It is claimed that the box is particularly suited to one-man safety car operation, as it allows transfers to be issued quickly and safely while the conductor collects fares or watches the track ahead.

Four of these machines were recently used at the time of the Eastern States Exposition at Springfield for the purpose of issuing transfers at a prepayment loading station at the fair grounds exit. The records for the week show that Monday the four machines issued 4,363, Tuesday 5,011, Wednesday 10,862, Thursday 10,763, and Friday more than 10,000. On Thursday one machine issued 2,136 and the four machines more than 8,000 in about three hours. According to plans these machines were to be tried out in Springfield on safety cars commencing early in October in order to get a service try-out on cars.

Safety Switch for Electric Heaters

A NEW type of heater switch is being placed on the market by the Consolidated Car Heating Company, which is designed to prevent trainmen from accidentally touching any live part while throwing the switch or while changing fuses. It is inclosed in a steel box, having the lower half of the cover hinged to swing upward. The handle works through a slot in this hinged cover in such a manner that it is impossible to open the cover without first throwing the handle to the "off" position. When in this position the fuse and all accessible parts are dead and all live parts are protected by insulating barriers. With the cover open it is also impossible to throw the handle to the "on" position. The switch mechanism works on a toggle principle, which gives a quick brake and quick make, regardless of a slow operation of the handle. Whenever the switch is in the "on" position the slot for the handle is closed by a slide. These various features insure protection for trainmen.



SAFETY HEATER SWITCH WITH COVER RAISED

This switch has been assigned type No. 311, and is rated at 50 amp. and 600 volts. A similar switch, No. 312, is made for 1,200-volt service.

In a recent issue the *Electric Railway and Tramway Journal* directs attention to the fact that owing to the linking up of bus services it is now possible to travel by this means a distance of 100 miles from London.

Automatic Compressor Oiling

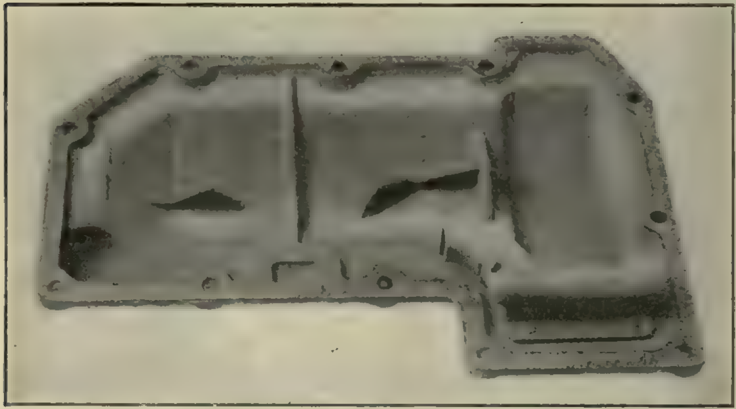
Oiling System for "Bungalow" Air Compressors Has Been Improved to Provide Direct, Positive and Automatic Lubrication

ALTHOUGH the splash system of lubrication employed in the Westinghouse "Bungalow" air compressor has proved eminently satisfactory, improvements have resulted in the standardizing of a direct, positive lubricating system entirely automatic. The only attention required is to replenish the oil supply in the crank case at intervals which can safely equal the longest permissible interval between general inspections of other car equipment. There is but one place in which to pour the oil. This consists of a fitting which also serves as a gage to indicate the oil level. In well-arranged installations it is readily accessible from the side of the car.

The cheeks of the crankshaft are extended to form oil throwers, which splash oil onto the front and back walls of the crank case and onto the cover, as the crankshaft rotates. The oil thrown against the front wall drips down onto the pistons and thoroughly lubricates them. The oil thrown up onto the under side of the cover drains from distributor ribs, provided for this purpose, into both crankshaft bearings and the connecting rod bearing, providing these parts with flood lubrication.

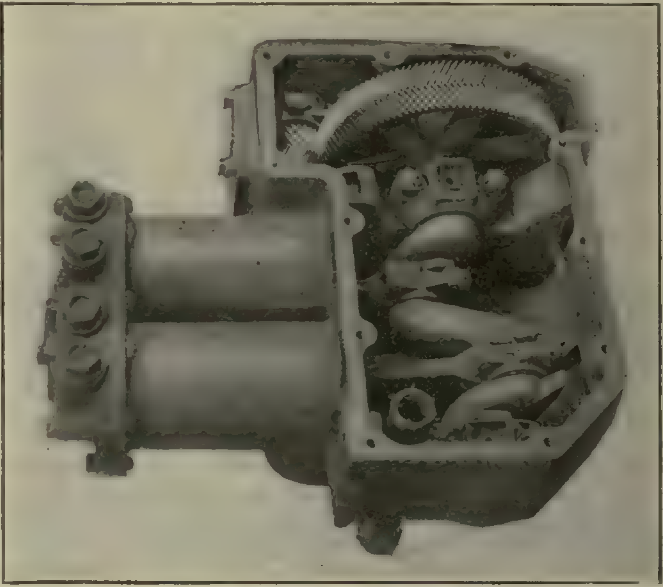
Some of the oil dropping on the connecting rod flows down a groove in the top side of the rod to the wrist pin bearing. The oil splashed against the back wall of the crank case flows down into a trough by which it is conducted over into the gear case. Some of this oil is carried up by the gear and thrown off into a trough, so designed and placed above the gear as to drop a definite and ample amount of oil into the armature bearings. The surplus flows back into the gear case.

The oil passage leading from the crank case to the gear case is restricted to such a size that it will, combined with the pump action of the gear, maintain a certain definite oil level in the gear case. Thus the gear is amply lubricated and sufficient oil carried up to the armature bearings, and at the same time the gear runs in a small quantity of oil, thereby preventing the generation of heat.



AT TOP, UNDERSIDE OF CRANK-CASE COVER FITTED WITH OIL DISTRIBUTOR RIBS. AT BOTTOM, THREE RINGS IN THE PISTON PREVENT OIL FROM ENTERING AIR SYSTEM

Oil throwers on the armature shaft and a catcher on its housing, with a return passage to the gear case, insure that any excess oil passing by the large armature bearing will go to the gear case instead of over into the motor. This return passage is connected into the bottom of the gear case, which provides a seal and prevents even oil vapor reaching the motor.



TOP VIEW OF COMPRESSOR, SHOWING DIRECT OIL DISTRIBUTING FEATURES

The concave end of the armature is protected by a metal shield, and any oil which may have seeped past the bearing will be deflected into a passage and conducted away instead of being permitted to reach the motor windings. The various oil conductors and passages are so arranged that the integrity of the lubricating system will not be affected by the tilting of the car on a curve, either to restrict the flow of oil to the parts where it is desired or to permit flooding of oil to parts it should not reach.

The design of the pistons and cylinders is such as to limit the passage of oil from the crank case side to the pressure side of the pistons to an amount such as will insure the proper lubrication. The pistons are neatly fitted to the cylinders, and beveled grooves are provided on the non-pressure edge of the rear packing ring groove and that immediately ahead of the wrist pin. The excess oil is therefore wiped back by the rings, finally reaching the rear groove, from which it drains into the crank case through a hole provided for this purpose. An absolutely tight joint is maintained at the various covers by the use of cork gaskets. To prevent mechanical injury the gaskets are shellacked to the part receiving the least handling when the compressor is dismantled. The ribs and projections add strength to the castings as well as provide a means for directing the oil to a point when needed for lubrication.

The Atlantic City Convention Programs

Convention Motto: BE ON TIME

All Associations

MONDAY, OCT. 11

Registration and distribution of badges at booth, right of entrance, Youngs Million Dollar Pier. American Association; all day; all other associations 9.30 a.m. to 12.30 p.m.

American Association

TUESDAY, OCT. 12

9:30 a.m. to 12:30 p.m.

All meetings held in Greek Temple

Annual address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of convention committees.

Reports of committees:

On compensation for carrying United States mail.

On electrolysis.

On national relations.

Address on "Problems of Fuel Supply," by Eugene McAuliffe, president Union Colliery Company, St. Louis, Mo.

Reports of committees:

Aera advisory.

On company membership.

Discussion of report of the Federal Electric Railways Commission, led by Philip H. Gadsden, vice-president United Gas Improvement Company, Philadelphia, Pa.

WEDNESDAY, OCT. 13

9:30 a.m. to 12:30 p.m.

Reports of committees:

On fare systems.

On publicity.

Committee of One Hundred.

Paper on "Possibilities of Transporting Other than Passengers on Interurban Lines—Britton I. Budd, President, Metropolitan West Side Elevated Railway, Chicago, Ill.

Address on "Training of Electric Railway Personnel," by Martin Schreiber, manager Southern Division, Public Service Railway, Camden, N. J.

Address on "Settlement of Labor Disputes in the Interest of the Public and its Influence on Fares," by Hon. Henry J. Allen, Governor of Kansas.

THURSDAY, OCT. 14

9:30 a.m. to 12:30 p.m.

Report of committee on valuation.

Paper on "Utility Regulation and Rate of Return"—Cecil F. Elmes, manager Sanderson & Porter, Chicago, Ill.

Paper on "The Place of the Motor Bus"—Frank C. Pick, Commercial Manager, London Electric Railway Co., London, England.

Paper on "The Place of the Motor Bus as a Supplement to Electric Railways"—R. Gilman Smith, Milwaukee Electric Railway & Light Co., Milwaukee, Wis.

Address on "The Motor Vehicle-Competitor or Ally?"—George M. Graham, Vice-President, Pierce-Arrow Motor Car Co., Buffalo, New York.

Reports of convention committees:

Unfinished, and general business, and election and installation of officers.

Engineering Association

MONDAY, OCT. 11

2:30 to 5:00 p.m.

Meeting Held in Engineers' Hall

Annual address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of committee on resolutions.

Reports of committees:

On way matters.

On buildings and structures.

TUESDAY, OCT. 12

2:30 to 4:30 p.m.

Meeting held in Greek Temple

Joint meeting with Transportation & Traffic Association.

Report of the committee on safety car operation.

4:30 to 5:30 p.m.

Meeting held in Engineers' Hall

Paper on "Standardization and Its Effect on stores." (a) "From a Storekeeper's Standpoint," P. F. McCall, storekeeper, South Side Elevated Railway, Chicago, Ill.

WEDNESDAY, OCT. 13

2:30 to 5:00 p.m.

Meeting held in Engineers' Hall

Reports of committees:

On power distribution.

On power generation.

On national electrical safety code.

Address on "Our Proposed National Power Policy," by W. S. Murray, chairman superpower survey, United States Geological Survey.

THURSDAY, OCT. 14

2:30 to 5:00 p.m.

Meeting held in Engineers' Hall

Reports of committees:

On equipment.

On heavy electric traction.

On standards.

Address on "Electrification of Railroads," by A. H. Armstrong, chairman, electrification committee General Electric Company, Schenectady, N. Y.

General business, and election and installation of officers.

Transportation & Traffic Association

MONDAY, OCT. 11

Booth, Young's Million Dollar Pier

2:30 p.m. to 3 p.m.

Meeting held in Greek Temple

Annual address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of convention committees.

3 to 4 p.m.

Joint meeting with Accountants' Association. Report of committee on collection and registration of fares.

4 to 5:30 p.m.

Joint meeting with Claims Association.

Report of committee on code of traffic principles.

Paper on "Automobile Hazards," by C. M. Talbert, commissioner of streets and sewers, St. Louis, Mo.

TUESDAY, OCT. 12

2:30 to 5 p.m.

Meeting held in Greek Temple

Joint meeting with Engineering Association.

Report of committee on safety car operation.

WEDNESDAY, OCT. 13

2:30 to 5 p.m.

Meeting held in Greek Temple

Report of committee on economics of schedules.

THURSDAY, OCT. 14

2. 30 to 5 p.m.

Meeting held in Greek Temple

Reports of committees:

On express and freight traffic facilities and costs.

On merchandising transportation.

General Discussion.

General business, reports of convention committees, and election and installation of officers.

Accountants' Association

MONDAY, OCT. 11

2:30 to 3 p.m.

Meeting held in Accountants' Hall

Annual address of the president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of convention committees.

3 to 4 p.m.

Meeting held in Greek Temple

Joint meeting with Transportation & Traffic Association.

Report of committee on collection and registration of fares.

TUESDAY, OCT. 12

2:30 to 5 p.m.

Meeting held in Accountants' Hall

Reports of committees:

On accounting-claims.

On accounting-engineering.

On standard classification of accounts.

Paper on "Accounting for Material Received and Used, Including Inventories," by R. A. Weston, certified public accountant, New Haven, Conn., formerly general storekeeper, New York, New Haven & Hartford Railroad.

Paper on "Cost of Service Accounting" by H. J. Davies, secretary-treasurer Cleveland Railway, Cleveland, Ohio.

WEDNESDAY, OCT. 13

2:30 to 5 p.m.

Meeting held in Accountants' Hall

Paper on "Financial Problems Confronting Public Utilities During the Period of Reconstruction," by Harry E. Mendes, member of Touche-Niven & Company, certified public accountants, Cleveland, Ohio.

Paper on "The Accounting Profession," by George L. Vannais, certified public accountant, Hartford, Conn.

Reports of Convention Committees:

Election and installation of officers.

Claims Association

MONDAY, OCT. 11

2:30 to 4 p.m.

Meeting held in Claims Hall

Annual address of the acting president.

Annual report of the executive committee.

Annual report of the secretary-treasurer.

Appointment of convention committees.

Reports of committees on membership, subjects, safety, ways and means, interchange of claims statistics and constitution and by-laws.

4 to 5:30 p.m.

Meeting held in Greek Temple

Joint meeting with Transportation and Traffic Association.

Report of committee on code of traffic principles.

Paper on "Automobile Hazards," by C. M. Talbert, commissioner of streets and sewers, St. Louis, Mo.

TUESDAY, OCT. 12

2:30 to 5 p.m.

Meeting held in Claims Hall

Paper on "Automobile Hazards," by Ralph Stickle, assistant superintendent accident department Cleveland Railway, Cleveland, Ohio.

Written Discussion by L. H. Roche, General Inspector Associated Bureaus, Pittsburgh Railway, Pittsburgh, Pa.; W. G. Fitzpatrick, general claims attorney Detroit United Railway, Detroit, Mich., and J. H. Hanlon, claim agent United Railroads of San Francisco, Cal.

WEDNESDAY, OCT. 13

2:30 to 5 p.m.

Meeting held in Claims Hall

Paper on "Accidents—Cause and Prevention," by F. E. Shumate, general attorney Atlanta Northern Railway, Atlanta, Ga.

Written Discussion on "Cause and Prevention of Accidents," by R. N. Hemming, Superintendent Transportation Indiana Service Corporation, Fort Wayne, Ind.

Written Discussion on "Co-operation of Trainmen," by J. E. Duffy, General Superintendent, New York State Railways, Syracuse, N. Y.

THURSDAY, OCT. 14

2:30 to 5 p.m.

Free-for-all discussion of the following topics suggested by members to the subjects committee at the mid-winter meeting, (members limited to five-minute discussion): "The increased cost of claims and some of the reasons contributing thereto"; "Prosecution of claims for damage to company's property"; "How best to safeguard releases from attack"; "Value of signed statements"; "The best method of keeping in touch with witnesses"; "Value of secret service"; "Handling blind and fraudulent cases."

General business, reports of convention committee, and election and installation of officers.

Letter to the Editors

The Movie and Other Publicity Means

Georgia Railway & Power Company

Atlanta, Ga., Sept. 30, 1920.

To the Editors:

While I have read with real interest your editorial suggestion in the Journal for Sept. 25, I am convinced that the question is not "Shall we use the movie," but how soon can we use it. The reason for not using it here has been that the only kind of movie proper to use is one thoroughly comprehensive and complete in every detail, which would be more expensive than one company would probably want to undertake.

My idea about the movie for the electric railway industry is that we should have two kinds. One for the system operated by hydro-electric power, and the other for the system using coal to generate electricity. It would be impossible to estimate the extent of the public interest, for instance, in a picture which begins with the showing of a bank of clouds and attractive mountain scenery, followed with a rainfall, streams trickling down the mountain side forming a larger body of water harnessed by a massive dam. Then a power house and transmission lines, followed by all phases of street car operations, with possibly a showing of the old horse car to illustrate the progress that has been made.

The other film could begin with a scene in the coal mine, followed by a representation of transportation with the increased prices of coal and cost of transportation brought out. This picture should be carried clear through to a showing of street car operations, including repair shop as well as the carhouse activities at 4 a.m., when the movie patrons are asleep. Sight should not be lost of the opportunity to show some of the public weaknesses, such as the blocking of car entrances, failure to move forward, talking to the motorman, one man in an auto delaying a car containing sixty-five people, etc. The possibilities of the movie are limitless.

There are of course situations where the influence of the movie would be limited. Members of the State Legislature are to a very large extent named by people living in the rural districts, most of whom would not be reached by the movie. Then there are questions that arise from time to time that are too specific to be answered effectively by motion pictures, and the practice of waiting until an appropriate time to put on a newspaper campaign, covering a limited period, brings us to a realization of the necessity for some means for supplementing the newspaper, preferably the educational movie. The next step seems to be a multigraphed letter, having the appearance of being typewritten, going, say, every Monday morning, in the form of a personal communication, to individuals in the county or state involved—these individuals being carefully selected because of their importance and the value of their judgment in their respective communities. In this way, if the whole story is told in brief letters covering a long period, a knowledge will be planted in the minds of an important number of people in their communities, so that no opposing sentiment could possibly grow.

J. F. Trazzare,
Manager Employment and Public Relations.

Association News

ATLANTIC CITY CONVENTION, OCT. 11 TO 15

Association Reports for September

The following special reports and compilations were prepared by the Bureau of Information and Service during last month:

New Bulletin No. 125 on Wages, containing over one hundred recent changes in wage rates.

Safety Car Compilation; a summary of replies to a questionnaire.

New Bulletin on Fares, giving the latest information on increased rates of fare classified according to the cash fare paid in various cities throughout the country.

Number of Jitneys in Various Cities; a summary of replies to a questionnaire, showing the number of jitneys operating in each city and the rules and regulations covering their operation.

Tables Showing Effect of Increased Fares on Operating Revenues for a Number of Typical Cities; a revision of the information shown in a former compilation entitled "A Series of Charts," bringing the information up to Sept. 1, 1920.

List of Cities Where Motor Bus Companies Are Operating, either as auxiliary or as a competitor to electric railways, with data on number of buses, miles of route, fare, etc.

Table of Official Valuations per mile of track and per car based on Public Service Commission division.

Joint Meeting in Providence Great Success

New England Street Railway Club and Rhode Island Company Section No. 12, A. E. R. A., Enjoy Two Sessions and Dinner

With almost two hundred in attendance, about half of whom came from Connecticut and Massachusetts, the New England Street Railway Club and the Rhode Island Section No. 12, American Electric Railway Association, held a most successful meeting at the Narragansett Hotel in Providence on Thursday, Oct. 7. There was an afternoon session and a dinner and evening session.

I. A. May, president of the New England Street Railway Club, and W. C. Slade, president of Rhode Island Section No. 12, and also vice-president, for Rhode Island, of the New England Street Railway Club, alternated in the chair during the sessions.

The afternoon session at 4 o'clock was devoted to the subject of publicity or public relations, the one address being delivered by Fred A. Cummings, Public Relations Representative of the Eastern Massachusetts Street Railway Company, and the informal discussion which followed this address lasted until dinner was called at 6:15. After the dinner, at which music was furnished by the Rhode Island Section Orchestra, an excellent address was delivered by W. C. Bliss, chairman of the Public Utilities Commission of Rhode Island, followed by the other announced address of the evening by Joseph F. Berry, attorney for the Connecticut Company in Hartford. Mr. May, presiding, called upon the following for extemporaneous remarks: T. F. Green, Z. W. Bliss, and F. H. Swan, the three receivers of the Rhode Island Company; W. R. Dunham, president of the Connecticut Company Section No. 7, and C. C. Pierce of the General Electric Company. These talks were both entertaining and instructive.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION

PERSONAL MENTION

Commission Taking Evidence

Canadian Body Begins Inquiry Into Hydro-Electric Radial Railway Matters

The Ontario Hydro-Radial Railway Commission, under the chairmanship of Justice Sutherland, began its sittings at Toronto on Sept. 28 for the purpose of considering evidence in connection with the whole project. The personnel of this commission was given in the ELECTRIC RAILWAY JOURNAL on July 24, at the time the Ontario Government announced its appointment. Since that date T. A. Russell has resigned as a member, and Brigadier General C. H. Mitchell, of the Toronto University staff, was appointed in his place.

ENGINEER GABY FIRST WITNESS

The following are engaged as counsel: I. F. Hellmuth, K.C., representing the Ontario Government; Colonel C. S MacInnes, K.C., for the Hydro-electric Power Commission; Robert MacKay, K.C., for the Ontario municipalities supporting the radial railway undertaking, and R. S. Robertson on behalf of the municipalities which are opposed to proceeding with the project and some other municipalities which are not included in the present scheme.

Chief Engineer F. A. Gaby of the Hydro Commission was the first witness called. He reviewed the progress of the hydro-radials since their inception in the year 1912, when the municipalities comprising the Ontario Municipal Electrical Association discussed electric transportation on the same basis as electric power distribution.

TORONTO & EASTERN FIRST

The first road dealt with was the Toronto & Eastern Railway. The estimates placed before the Government had amounted to $7,206,687 for construction. An increase to $8,368,794 had been made by the Government, which included rolling stock and substations and to provide for increases in labor and materials since the date of the commission's estimate of 1919 was presented as above for construction only. Of the increase between the two sets of figures above mentioned, Mr. Gaby stated that $400,000 to $500,000 had been occasioned by allowance for 6 miles of track within the city limits. The terminal of the road was planned to be at Bay Street.

Toronto to St. Catharines was next taken up. It was expected to purchase the existing line from Toronto to Port Credit, constructing 12 miles from the latter point to Oakville, and purchase the Hamilton Radial line from Oakville to Hamilton. From Hamilton to St Catharines, the line would run east parallel to the Grand Trunk steam road to Fruitlands, then across the Grand Trunk to Winona, and from there over the Jordan River into the city of St. Catharines. At St. Catharines it was proposed to purchase from the Dominion Government the Niagara, St. Catharines & Toronto lines to Niagara Falls and Port Colborne.

The cost of the Toronto terminals would be divided between the Toronto & Eastern and the Toronto & St. Catharines divisions in proportion of about two-thirds and one-third respectively.

Delaware Tube Plan Revived

Plans for a tube beneath the Delaware River will be discussed at a conference in the office of the Mayor of Philadelphia to be attended by Thomas E. Mitten, president of the Philadelphia Rapid Transit Company, and representatives of the Pennsylvania and Reading Railroads. Announcement to that effect was made at the Mayor's office on Sept. 12.

No talk of a tunnel under the Delaware to Camden has been heard in recent years prior to the above announcement except in the communications to the press from Samuel Rea, president of the Pennsylvania Railroad. Mr. Rea in announcing that the Pennsylvania, which operates the ferries, would not oppose the bridge project, always coupled with that the phrase "or tunnel project."

Another plan under contemplation involves double-decked ferryboats. That plan, it is said, could readily be adopted and would greatly reduce the traffic congestion if approaches for passenger traffic from footways running from the top of the hill at Market Street straight to the elevated railway structure were built in order that foot passengers be not mixed up with vehicular traffic running on the surface.

Electrification Nearing Completion

The Northeast Oklahoma Railroad will soon be in a position to use electricity on its line between Douthat and Miami, Okla. The last of the poles was installed on Sept. 30 and some of the trolley wire has been strung. A substation is being erected at Picher. The company has several cars in the carhouse in Miami which were bought from other cities for use until new ones can be delivered. The cars have been repaired and repainted. Most of the work in preparation for electrification has been completed.

Campaign Under Way

Toledo Prepared for Exciting Times Over Railway Settlement Proposal Soon Before Voters

The first day of registration at Toledo, Ohio, under the new conditions of twice as many precincts and women voting brought forth a showing which indicates that the women will take a large part in the election at which the railway franchise and municipal ownership propositions will come up Nov. 2.

WOMEN DEMAND MILNER RUN

The women have also demanded that W. L. Milner, the author of the service-at-cost measure and head of a commission appointed by Judge Killits of the Federal court, be a candidate for Mayor next fall. This indicates that they want the franchise settlement to be put into effect and desire Mr. Milner to be the man to start it on its way.

The *News-Bee*, which waged a campaign in favor of the twin municipal bonding ordinances when they were defeated by a majority of more than 4,000 votes, has taken up the battle against the Milner plan. That paper claims it is a perpetual franchise and a "blank check" system of financing.

Both of these claims are offset by improvements made upon the Tayler plan and backed by the same paper when there was a fight in conferences between Mr. Milner and Henry L. Doherty & Company interests.

The city begins to acquire an equity in the property of the new Community Traction Company as soon as the sinking fund begins to retire outstanding bonds. And this process will continue, so that the city will have nearly one-third interest at the end of the first ten years. It will gain representation on the board of directors along with the equity in the property. The last fifteen years of the twenty-five-year grant will be devoted to a process of amortization through which complete ownership of the system will be obtained with less than 0.8 cent extra fare during the period, according to Mr. Milner.

COUNCIL CONTROLS SERVICE

Council has the full authority to control service. Additional financing cannot be made without the authority granted by the elected representatives of the citizens of the city. The bond measures, ostensibly for municipal ownership of some kind of a transportation system, are designed to give to Council $7,000,000 to spend.

Very little of a definite nature is available on the municipal ownership plan. No campaign is being made in its behalf yet.

Fresno Strike Over

Boycott and Intimidation Fail as Weapons Against Local Railway in Labor-Ridden Town

The strike of the employees of the Fresno (Cal.) Traction Company has not been declared off, but traffic has again become normal and nearly all of the strikers have found work elsewhere. The earnings of the company for the first three weeks in September show a substantial increase over the earnings for the same period last year.

FIRST TROUBLE IN TWENTY YEARS

In many respects the strike at Fresno was unusual. The company up to the time of the present disturbance had not had a strike in the twenty years of its existence. Its employees until very recently did not belong to any union, though constant pressure was brought upon them by unions to join the Amalgamated Association. Finally in response to the demands of these outside unions a capable organizer was imported from Tacoma. In April and May every effort was made to get the traction company employees to join the union, they being promised the full support of all the unions in Fresno in securing recognition if they would do so. The traction company paid no attention to the movement and something more than a majority of the men were finally induced to join. The men then presented a demand for recognition of the union, stating that they would not discuss any question of hours or labor until the union had been recognized. The request for recognition was refused and a strike resulted, about one-third of the men choosing to stay with the company.

Other men were brought to Fresno immediately and service was resumed. The men who remained loyal to the company were not subjected to the hazard of attempting to operate cars during the first strike period.

The morning paper came out strongly against the traction company, declaring it should recognize the union, and coloring all of its news in favor of the strikers. The evening paper adopted more of a "middle-of the-road" attitude.

VIOLENCE RESORTED TO

The men who operated the cars were from time to time assaulted, but on the whole were able to take care of themselves. Jitney lines were formed all over the city by the unions and the strikers and a systematic course of persuasion and intimidation established to keep people from riding on the cars. Members of various unions declared boycotts on the railway and at permanent corners pickets were placed to persuade people to patronize the jitneys instead of the cars. Members of unions who rode on the cars were fined and in one case pressure was brought to bear which cost the user of the car her job. The boycott was highly effectual, but independent investigation showed that outside of unions there was not much sympathy with the strike.

A committee of sixty businessmen investigated the situation and with the exception of two declared the attitude of the railway to be entirely proper and undertook to bring about a strike settlement. The strikers finally voted to return without recognition of the union, yielding their seniority to the old employees who had stayed on the job, but the next day again quit work.

Thereupon the City Council passed an ordinance which in effect eliminated all of the jitneys where they competed with the street car lines. In the meantime the people had again begun riding on the cars and traffic gradually increased. At the time of the passage of the ordinance traffic was 50 per cent normal. It increased gradually and became normal with the withdrawal of the boycott.

The city of Fresno is the center of a very prosperous farming and fruit growing territory. It is essentially a merchandising city. The increase in wealth in the tributary territory during the last few years has been very large. High prices have been received for raisins, peaches and other fruits, and the income from oil well development has been very large. A large amount of Fresno capital is invested in oil wells, but there are no wells near the city. The city increased in population in the last ten year more than 80 per cent.

Labor in the city is employed largely in the packing and canning of fruits and the incidental manufacturing work that goes with a city of 50,000 people. For many years, notwithstanding it is a city of trade, it has been one of the principal centers of union labor in the West. The principal newspaper is a strong advocate of union labor. The city generally is so prosperous as to yield to union labor demands in various lines of activity without any fight. Even the newspaper reporters and school teachers are organized.

All Cincinnati Roads Under Service at Cost

Service at cost will be the basis of all electric railway fares in the city of Cincinnati, according to an opinion by Judge Stanley W. Matthews of the Hamilton County Court of Common Pleas, who recently dissolved temporary restraining orders preventing the Ohio Traction Company from charging more than 5 cents between the villages of Wyoming and Lockland and the Zoo.

The service-at-cost ordinance, the Judge held, is not only a contract between the city of Cincinnati and the Cincinnati Traction Company, but is also a law governing traction lines within corporation limits. He said the home rule charter of the city gives its ordinances the effect of state laws.

The villages of Wyoming and Lockland brought suit because, it was stated, they had contracts with the Ohio Traction Company whereby they were guaranteed a 5-cent fare between their corporation limits and the Zoo, which lies about a mile within the city limits.

Detroit Injunction Argued

Fight Still in Progress Over Rights of City Under Recent Municipal Ownership Authorization

Arguments of both parties in the injunction suit brought by the residents of Clairmount Avenue to restrain the city of Detroit, Mich., from constructing a municipal railway on Clairmount Avenue have been finished. Corporation Counsel Wilcox has ten days in which to submit his brief in answer to that of Attorney Weadock, who represents the 110 protesting residents. The case is being heard before Judge William B. Brown, Grand Rapids.

FORMER RAILWAY ATTORNEY IS COUNSEL

It is maintained by Mr. Weadock, former attorney for the Detroit United Railway, that the ordinance for the submission of the Municipal Railway proposal to the voters is invalid in that it deprives abutting property owners of their right of ingress and egress to their property, and because it attempts to authorize as a part of the Clairmount line, street railway tracks in streets of Hamtramck before having obtained the consent of that village. Hamtramck is entirely surrounded by the city of Detroit and the proposed route for the Clairmount line traverses the village.

Another point of the ordinance attacked by Mr. Weadock is the fact that the ordinance provides for a line in Linwood Avenue where the street is now occupied by a Detroit United track. The purchasing by the sinking fund commission of bonds for financing the street railway is branded as illegal on the ground that it is a contravention of municipal safeguards and against public safety. It is also argued that the ordinance is inoperative because there are no valid funds for carrying on the work, and that contracts to do the work are invalid because the law was not followed strictly by the Commissioner of Purchases and Supplies in advertising for bids.

CITY CONFIDENT OF ITS RIGHTS

In answering, Corporation Counsel Wilcox defended every step so far taken by Mayor Couzens, the City Council and the Street Railway Commissioners in the carrying out of the proposed municipal railway project, and upheld the contracts let for work upon the lines now under contract. That the city can take over the Linwood Avenue line at any time and oust the Detroit United Railway was argued by the corporation counsel since the company is operating there only on a day-to-day agreement.

Mr. Wilcox argued that, if necessary, the lines in Hamtramck can be altered in route to go around the village. He said that the people voted on a proposition, not an ordinance, and that it was not a piece of legislation.

In reply to the claims made by the Clairmount residents, it was denied by

Mr. Wilcox that the construction of a double-track railway on their street would shut them off from their property, except for the momentary passing of a car. He stated that engineers for the commission had made surveys and recommend Clairmount as a route, but that their recommendation might not be accepted by the commission.

All contracts, according to the corporation counsel, have been properly advertised, and the Sinking Fund Commission in buying the Public Utility Street Railway bonds was merely following the established custom.

In answer to Attorney Weadock's claim that the $15,000,000 was insufficient and that the bond issue was therefore unlawful, Mr. Wilcox asserted that the adoption of the monolithic type of construction of tracks would enable the city to save enough money to acquire not only the 156 miles of track included in the class A and B lines but also the 62 miles of class C lines, and come within the $15,000,000 bond issue voted on April 5. He denied that it was necessary to build the class C lines out of the $15,000,000, and said that the sample ballot issued by the city called attention to a financial plan for the A and B lines. The charter was held to provide for the issue of street railway bonds to add to the system, and these bonds, according to Mr. Wilcox, were not a lien against the city but against the railway itself.

Interpretation of Utility Measure Asked

Assuming that the opinion recently given by J. O. Bailey, Assistant Attorney General, was sound as far as it pertained to the utility act giving to the Oregon Public Service Commission authority to remove any and all unreasonable franchise provisions now imposed on the traction division of the Portland Railway, Light & Power Company, the commission has asked Attorney General Brown to give legal construction and to express the propriety of the commission taking summary action upon a matter as important and as highly involved as the one presented.

The commission also seeks to ascertain from the Attorney General its actual jurisdiction in the matter and a statement as to what procedure should be followed in making a determination of the issues legally effective. Three questions were submitted for legal interpretation, as follows:

1. What part or parts, if any, of the application for removal of franchise provisions now imposed upon the company may properly be considered and to what items, if any, does our jurisdiction extend?

2. What is the extent of our jurisdiction, and the proper and necessary procedure to make a determination legally effective?

3. What consideration must the city of Portland receive if the effect of action taken by us reflects itself seriously upon the finances of the city?

$862,000 for Betterments

Program of Improvement Work Under Way on Pacific Electric Lines in Southern California

Since July the Pacific Electric Lines, Los Angeles, Cal., have undertaken a vast program of improvement work on its system, which had been delayed during the past three years due to the late war affecting the labor and material situation. The greater portion of this improvement work became necessary principally through franchise and legal obligation; the following is the schedule of the improvement jobs now under way:

Pasadena City Lines (East Colorado Street) — 2,154 lin.ft. double-track reconstructed with 7-in. 127-lb. grooved girder rail. Rock ballast and asphalt concrete pavement. Treated ties.

Long Beach City Lines (East Seventh Street)—11,250 lin.ft. of double-track reconstructed with 7-in. 91-lb. Tee rail (50 per cent); balance (50 per cent) with $4\frac{13}{16}$-in. 75-lb. C. S. revised rail. Rock ballast and oil macadam pavement. Treated ties.

Long Beach City Lines (Magnolia Avenue)—2,375 lin.ft. single-track reconstructed with $4\frac{13}{16}$-in. 75-lb. C. S. revised rail. Rock ballast and oil macadam pavement.

Santa Ana City (North Main Street)—Converting 6,110 lin.ft. of track to single-track line; 6,110 lin.ft. single-track reconstructed with $4\frac{13}{16}$-in. 75-lb. C. S. revised rail. Rock ballast. Oil macadam pavement.

Santa Ana City (East Fourth Street)—2,300 lin.ft. double-track reconstructed with $4\frac{13}{16}$-in. 75-lb. C. S. revised rail. Rock ballast. Oil macadam pavement.

San Bernardino City Lines (Third Street)—Reconstruct 2,050 lin.ft. single-track with 7-in. 127-lb. grooved girder rail. Rock ballast. Treated ties. Asphalt pavement.

San Bernardino City — New substation building and equipment to improve power conditions.

Redondo Beach—Pacific Electric is wrecking its Wharf No. 2 which extends 600 ft. out into the Pacific Ocean, including trackage thereon. This wharf formerly served as freight steamer unloading dock, but company's business is now handled at its Wharf No. 3 at Redondo Beach.

Long Beach—Relocating and construct as new lines 2,310 lin.ft. of single-track and 8,600 lin.ft. of double-track as a portion of the company's Long Beach-Wilmington line and local city Seaside Park line, due to the county of Los Angeles Board of Flood Control and the United States War Department constructing and defining a permanent channel 720 ft. in width for the Los Angeles River and at the point for its emptying into the Pacific Ocean. The Pacific Electric in the relocation of its line relinquished its right-of-way for a consideration as awarded in interlocutory judgment of the court, outlining Pacific Electric rights and setting forth a fixed sum for settlement for right-of-way taken for the channel. Likewise, the county furnishes right-of-way easement for the company's relocated lines to be constructed on the east and west dykes of the new river channel being dredged by the county. The company is also provided rights for a double-track portion of one of the relocated lines over and across one of the bridges to be constructed by the county to span the new channel.

Glendale—Relocation of portion of the company's Glendale-Burbank Line at Arden Junction account of the County of Los Angeles Board of Flood Control constructing a new channel for Verdugo Wash.

King Street Station (Santa Ana Line)—Account of flood control work on Santa Ana River channel Pacific Electric is replacing its 1,104-ft. single-track pile trestle bridge spanning the river with 270 ft. of steel span structure; filling in and abandoning the maintenance of 744 ft. of the structure, while remaining portion of pile trestle will be replaced with common standard single-track pile trestle.

El Moro Station — Account of County of Orange Flood Control Board constructing and defining a new channel for the Santa Ana River at the point where it empties into the Pacific Ocean the Pacific Electric, operating its Newport Beach Line adjacent to the ocean, is constructing 525 lin.ft. of single-track steel span bridge to span the point where relocated river channel will be constructed by the county.

Rio Hondo Station (Whittier Lines)—The Pacific Electric is replacing 716 lin.ft. of double-track pile trestle with 122 ft. of double-track steel spans and replacing 594 ft. of present double-track pile trestle in kind. Two 60-ft. steel girder spans will be placed on one track and two 62-ft. steel girder spans on the other track. During years 1915 four 50-ft. spans were placed in this bridge, giving 100 ft. of the structure clear-spanned with steel girders, but County Flood Control work in defining a permanent channel for the Rio Hondo necessitates adding the extra spans at this time.

The approximate cost of the improvements mentioned, exclusive of the flood control program, is $525,000.

The approximate cost of the flood control work, which is only a portion of the work of this nature that the company is facing, is $337,000.

Segregating the improvement work by cities the approximate cost in each city is: Pasadena City Lines, $77,000; Long Beach City Lines, $196,000; Santa Ana City Lines, $142,000; San Bernardino City, $107,000.

Vote Urged to Establish Municipal Line

John J. Hamilton, Commissioner of Public Parks and Buildings, has recommended to the City Commission of Pasadena, Cal., that the proposition of constructing an electric railway between Pasadena and Los Angeles be submitted to the voters at the November election. Assembling all items of cost as reported and adding $75,000 for interest during construction, $100,000 for terminal buildings in Pasadena and Los Angeles and $12,000 estimated as the total cost of option, surveys, engineering and appraisal cost thus far incurred, the probable cost of the entire project ready for operation as set down by Mr. Hamilton will be as follows:

Cost of railway and equipment, exclusive of right of way......	$3,465,867
Right of way, including damages.	827,335
Terminal buildings	100,000
Duplicate electrical equipment, etc.	45,000
Interest during construction.....	75,000
Option, survey, appraisal, etc.....	12,000
Total	$4,525,202

In concluding a report which he made to the City Commission Mr. Hamilton said:

> I recommend that the city press this vital and important enterprise to the earliest possible completion. The present condition of the market for securities would prevent the sale of bonds at the present legal rate of less than 5 per cent, but this is a temporary condition, and the city commission should not permit the project to wait a day beyond the time when the money market rights itself.

At the November election the residents of Pasadena (Cal.) may have an opportunity to vote on the proposed $4,500,000 bond issue for the construction of the municipal railway, for Mr. Hamilton presented a resolution to this effect at the meeting of the City Commission on Sept. 1. Commissioner Reeves said that whereas he was in favor of the people voting on the project, he objected to the wording of the resolution "that public interest and necessity demand" the construction of the railroad. The matter has been delayed so that City Attorney Howard will have time to decide whether the question should be included on a ballot with other questions to be voted on.

Employees Appeal to Board

Electric Railway Not Represented at Hearing to Consider Its Discharging Union Employees

The Washington & Old Dominion Railway was unrepresented before the United States Railway Labor Board on Oct. 5 in Chicago in the case in which employees are endeavoring to secure the reinstatement of men discharged "for the good of the service." This case was reviewed in the ELECTRIC RAILWAY JOURNAL for Oct. 2, p. 684.

DISTRICT COURT DENIED INJUNCTION

The Supreme Court of the District of Columbia had denied the application of the Brotherhood of Railroad Trainmen for an injunction to restrain the officers of the Washington & Old Dominion Railway from discharging any of the plaintiffs because of union affiliation. This court expressed the opinion that this railway came within the classes of railroads included under the transportation act of 1920, and that therefore this labor dispute came within the jurisdiction of the United States Railway Labor Board created by that act.

W. N. Doak, vice-president of the brotherhood, appeared at the Chicago hearing to place the case before the labor board. There was some question as to the jurisdiction of the board and as to failure of the plaintiff properly to bring the case before the board. After a great volume of matter had been put into the record, Chairman R. M. Barton sought by questioning to bring out exactly what it was that Mr. Doak would have the board pass upon. It was finally determined that two questions were involved: First, whether the board had jurisdiction to pass on the disputes as to wages and grievances. Second, whether or not the officials of the Washington & Old Dominion Railway had the right to discharge those men because they belonged to the union. If not, it was the plea that the board should order their reinstatement. There was no indication as to the answer that would be made to either of these questions.

MR. HENRY IN ATTENDANCE

Charles L. Henry, chairman of the committee on national relations of the American Electric Railway Association, informed the board that he had been in close touch with the committeemen of the Senate and House of Representatives while they were formulating the act, and that it had been the understanding that the electric lines, except those operated as an integral part of the steam trunk lines, were to be excluded from the provisions of the act.

The board also questioned Mr. Henry at some length as to what constituted an "interurban" line as spoken of in the act. Mr. Henry advised the board that the Interstate Commerce Commission had sent out an elaborate questionnaire to all the electric lines in an effort to determine more exactly whether any of them should come under the act. The result of this questionnaire has not yet been made public.

Charlton Ogburn Arbitrator

Will Act as Umpire in Settlement of Dispute Between Buffalo Company and Its Employees

Charlton Ogburn, New York, executive secretary of the Federal Electric Railway Commission, has been named by Governor Alfred E. Smith as the third member of the board of arbitration to settle the differences between the International Railway, Buffalo, N. Y., and its union employees, members of the Amalgamated. James H. Vahey, Boston, general counsel of the Amalgamated, represents the employees on the board, and Coleman J. Joyce, Philadelphia, counsel for the Mitten interests, represents the International. The first meeting of the board was held in New York City on Oct. 6.

Mr. Ogburn will be chairman or umpire of the board. At the conference in New York details of organization were agreed upon and the method of taking testimony was decided. All testimony and hearings will be held in Buffalo.

The position of the International Railway in the arbitration proceedings is outlined in a letter written by Herbert G. Tulley, president of the railway, to the company's representative on the board, Mr. Joyce. Mr. Tulley says the company has not receded in its stand that any increase in wages awarded the employees must be contingent upon the granting by the Public Service Commission of a higher rate of fare on the Buffalo city lines.

In his letter of instruction Mr. Tulley tells Mr. Joyce that "any further increase in wages shall be made effective only from the date when such increase in rate of fare is made effective as is necessary to make the payment of such increased wage possible."

Although the company's employees ask that the wage award be made retroactive to May 1, on which date their agreement with the company expired, they have announced their intention of allowing the board of arbitration to decide when the wage award shall be made effective. The company points out that Buffalo cannot fairly be expected to pay increased fare to meet the cost of increased wages at Niagara Falls or Lockport, or on the interurban lines.

In this connection Mr. Tulley says that "consequently, if a general increase in wages be ordered by the arbitration board, there must be a separate action to secure increased revenue to meet the separate requirements of each of the four different locations." The present rate of fare in Buffalo is 7 cents with transfers or four tickets for 25 cents. The men now are receiving a maximum wage of 60 cents an hour. They ask 88 cents an hour maximum.

Strike Settled Temporarily

Men at Kalamazoo on Strike Fifteen Days When People Fail to Approve Fare Increase

Some time ago the City Commission of Kalamazoo, Mich., granted the Michigan Railway a temporary local rate of fare of 10 cents cash and four tokens for 30 cents. At this time the company had an understanding with its trainmen that their wages were to be increased from 40 and 42 cents an hour to 60 and 62 cents, with 10 cents additional for overtime, so long as the company was able to collect the increased fare, granted by the City Commission as a temporary measure, but that the old rate of wages was to go into effect again if the company was forced to go back to the old rate of fare.

The matter of an increased rate of fare was placed before the voters of Kalamazoo on Aug. 31. While 300 more people voted in favor of the measure than against the proposal, it failed to receive the three-fifths vote required to make it effective. Consequently, the commission rescinded its temporary fare order and refused to do anything about fares until it should receive a petition signed by 5,000 qualified voters. The company therefore announced to the men that the wages would be returned to the former scale. The trainmen then struck.

After a suspension of service lasting fifteen days a petition was presented signed by 6,000 voters. The commission then put into effect the rate of fare originally granted the company for the purpose of paying the increased wages, and the men went back to work at the 60-cent and 62-cent scale. The fare question is to be voted on again at the election on Nov. 2.

As a result of the August election the car riders lost their car service, the trainmen lost their pay for fifteen days and the railway lost its revenue for a like period.

Trainmen on "Vacation"

Trainmen of the Northwestern Ohio Traction Company refused to take out their cars because they objected to new schedules placed in effect on Oct. 2. Officially the men went on a "vacation" till the schedules are adjusted.

The company is insured against loss on account of strikes, riot or insurrections.

Company officials declared the cars would not operate till a new force of platform men was secured. If the vacation continues 125 more men may be thrown out of work. F. K. Woodring, general manager, said the company would not take back the men who quit because they did not like the schedules. He said there had been no wage difficulties and no differences about working conditions.

The general offices of the company are at Oak Harbor. Power, light and line workers were not affected, but they may be if the vacation is prolonged.

District Court Intervenes in the New Orleans Tangle

The Mayor and the Commission Council of New Orleans, La., have been estopped from acting upon the award of the Special Masters in Chancery in the street railway controversy. The 8-cent strip car fare is still a remote possibility.

Judge King, of the Civil District Court, has issued an order granting the petition of the Assistant Attorney General of Louisiana, for a writ of injunction, without bond, prohibiting the city of New Orleans from increasing the street railway fares. The case has been alloted to Judge Cage, of Division A, who, on his own motion, has fixed the case for hearing on Oct. 15.

It is alleged in the petition of the Assistant Attorney General that the original franchises sold to the existing street railways were disposed of by the city, acting as agent of the State, under authority conferred on the city by the State for that special purpose. The franchises were all 5-cent franchises, and the Mayor and Commission Council are without authority to increase the fare, it is averred. It is further alleged that the present necessities of the New Orleans Railway & Light Company arise from improvidence.

The members of the local union of the Amalgamated Association of Street & Electric Railway Employees were to take a secret ballot on Wednesday evening, Oct. 6, on the acceptance of the Court's strike award. The principal point on which the men objected to the award, is the elimination by the Masters of their right to arbitrate. Judge Foster, however, has given them the right to appeal to the court.

It is believed that the men will accept the recommendation of the executive board that the union shall approve the court's findings.

The Facts About Nashville

The statement in the ELECTRIC RAILWAY JOURNAL for Sept. 25 regarding the strike on the railway lines of the Nashville Railway & Light Company, Nashville, Tenn., received by telegraph, was inaccurate. The facts are that on Aug. 21, 600 men, members of the Amalgamated, employees of the company, went on strike. Of the 450 platform men employed, 350 were among the strikers.

The company immediately put into operation 60 per cent of its normal service and has built up to normal from that point. The service was never tied up. No strike breakers were employed. The old men have not returned to work and will not return to work.

The union demanded a closed shop and the equivalent of 25 per cent increase in wages. The men struck without notice after a conference with B. C. Edgar, vice-president, and J. P. W. Brown, general superintendent. There was a strong public sentiment with the company from the beginning. The strikers spread rails, but a dynamite plot was thwarted. In connection with the dynamite plot and other disorders thirty-three strikers and many of their sympathizers were arrested. One hundred and twelve loyal employees remained at work. Only fifty-seven strikers known to be loyal men were re-employed during the first few days. No more strikers have been re-employed. The securing of new men made possible the quick return to normal service.

Plea for Power Conservation

Frequent and prolonged stopping of electric cars during rush hours, and costly interruptions of factory operations and all other electric service, will be unavoidable in spite of anything the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., can do, it is announced, unless each light and power customer immediately reduces his use of electricity 20 per cent betwen the hours of 7 a.m. and 7 p.m. The announcement was made through the medium of third-page newspaper advertisements placed in the Milwaukee papers on Sept. 26, 1920. It follows a similar appeal made about a week earlier which resulted in a reduction of about 4 per cent in the total use of electricity during the hours specified.

The company points out that it is up against the same conditions that handicap electric central stations in many other large cities at this time. The war stopped the expansion of the power producing facilities. Since the end of the war the company has been making every effort to get its new power plant ready for service. The first generating unit of 20,000 kw. is expected to be in operation within three months.

The company further points out that the best coal it can get today costs more than three times what good coal used to cost and it produces 15 per cent less energy. The co-operation of all customers in conserving electric current is again asked.

News Notes

Advance for Platform Men.—The platform men of the Chattanooga Railway & Light Company, Chattanooga, Tenn., have been granted an increase of 4 cents an hour effective Sept. 16. The present rate is from 41 to 45 cents and the men had requested an increase of 46 to 55 cents.

Wants Expert Retained.—The City Council of Akron, Ohio, has been petitioned by the Car Riders' League of that city to retain Delos F. Wilcox as expert to make an analysis and pass judgement on the proposed new franchise between the city and the Northern Ohio Traction & Light Company.

Railway Official Indicted.—The indictment of James W. Samuel, former assistant secretary and treasurer of the United Railways, St. Louis, Mo., on a charge of embezzlement of $27,619 of the company's funds, has been announced by the Circuit Attorney's office. Mr. Samuel immediately arranged for bond, which was placed at $5,000. The date for the trial has not yet been set.

Akron Grant Completed.—Work on the proposed franchise for the Akron, Ohio, lines of the Northern Ohio Traction & Light Company has been completed and the measure was to be submitted to the City Council at its meeting on Oct. 5. City Manager Laub has announced that he will demand that the measure be amended to prevent an increase in the fare above 10 cents.

East St. Louis Arbitration Begun.—Testimony offered by W. H. Sawyer, president of the East St. Louis & Suburban Railway, East St. Louis, Ill., in the hearing before the arbitration board on the wage difference between the company and the men, showed that conditions are such that the wage given to the East St. Louis and Belleville employees several weeks ago, of 70 cents an hour, is unjust both to the company and the public. Mr. Sawyer will present further evidence to support this contention at the next hearing of the board. Earlier in the same session Frank P. O'Shea, international vice-president of the Amalgamated, presented the demands of the men. The present wages are 53 cents an hour. The men want 90 cents an hour.

Advance for Pine Bluff Men.—Increases of 7 cents an hour in rates of pay of motormen of the Pine Bluff (Ark.) Company, retroactive to Sept. 21, were announced recently by J. L. Longino, manager of the company. With the increase of 3 cents an hour made on Aug. 1, this raise puts the rate of pay at 10 cents an hour more than prevailed on Aug. 1. This increase in pay of the motormen, together with increases to other employees, will absorb all of the additional revenue derived from the 7-cent fare. Under the new schedule of rates motormen in the employ of the Pine Bluff Company may earn from $125 to $159 a month, in addition to bonuses offered for careful operation of the cars.

One-Man Cars Cause Strike.—Union carmen of the Cedar Rapids & Marion City Railway, Cedar Rapids, Iowa, went on strike on Sept. 24 as a protest against the use of one-man cars by the company. The railway, which raised its fares recently from 6 cents to 8 cents, had announced that it would reduce the fare to 7 cents provided it was allowed to install "safeties." The City Council gave its consent to this proposition, but the carmen objected on the ground that adoption of this plan would lead to the reduction of wages and to the discharge of many men. The strikers returned to work on Sept. 27 with the understanding that wages should not be reduced.

Financial and Corporate

Cleveland Offers Stock

Railway Operating Under Model Service-at-Cost Points Out Strong Investment Features of Issue

Last April Henry J. Davies, treasurer of the Cleveland (Ohio) Railway, notified stockholders that it was necessary to sell the remaining 10,000 shares of stock in the treasury in order to make needed improvements. Additional stock is now being offered to present holders for full cash or on the basis of $10 down per share and $10 per month per share until the subscription has been paid in full.

In the letter which it is sending to its own stockholders, the Cleveland Railway first tells the history of the effort to obtain 7 per cent on its capital and of the refusal of the voters to sanction it Aug. 10. Then it itemizes various reasons why the stock should still be considered, even by investors, a sound and attractive "buy" at par. The letter is concluded in part as follows:

> The 6 per cent rate cannot be reduced, however, at any time in the future without our consent. Our ability to earn this rate is more certain than it has been in past years, for several reasons:
>
> 1. The life of the franchise has been extended. It ran originally to May 1, 1934; it runs now to May 1, 1944.
> 2. The maximum rate of fare that could be charged under the original franchise was 4 cents cash fare, seven tickets for 25 cents, 1 cent for transfer—an average of about 4 cents. The maximum now is 6 cents cash fare, nine tickets for 50 cents, 1 cent for transfer—an average of about 6.2 cents.
> 3. The maintenance allowance provided for in the franchise has been increased. It was 5 cents per car mile; it is now 10 cents.
> 4. Several amendments besides those mentioned have been made in the franchise since its original passage and acceptance. Every one of them has been of advantage to the stockholders of the company.
>
> This railway is the only one in the world that was able to pay 6 per cent upon its capital stock, without skipping a single quarterly payment through the period of the war. It is better able to earn that rate now than it has ever been before. It is as certain of earning it as the savings banks can be certain of earning and paying 4 per cent. Investment in the stock will earn a larger return than has ever been paid for savings banks deposits.
>
> INVESTMENT FEATURES OF STOCK OUTLINED
>
> The rate of return on our stock has been higher than the rate of return on the stocks of the steam railroad companies since the war started. Higher dividends have been paid upon some industrial stocks, but the dividends on those stocks fluctuate, and, while they may be in excess of 6 per cent at times they may fall below that rate at other times. Our dividend rate has been constant, and will continue to be 6 per cent until the city buys the property, if it ever becomes able to do so; and if it buys it must pay a price equal to $110 per share of stock.
>
> Ohio stockholders are reminded that the stock is not taxable by the State, nor by any county or municipality in the State.
>
> The dividend on the stock is exempt from the United States normal income tax.
>
> The stock is good collateral at any bank in Cleveland.
>
> Cleveland is still growing fast and the number of car riders is increasing faster. There were 3,665,000 more in June, 1920, than in June, 1919, an increase of more than 15 per cent.
>
> To take care of this increasing business we must add to our track and equipment. For these purposes money is needed. It is impossible to borrow enough at the banks. If we should issue bonds the equity of the stockholders would be thereby reduced. Preferred stock is still more objectionable. It was the intention and understanding of the framers of the franchise that money for additions to the property of the company should be raised by the sale of stock.
>
> We solicit your subscription for more stock. You may have as many shares as you wish to buy at par and accrued dividend and you may pay for the shares at your convenience at any time within a year. For convenience in calculating the dividend we prefer that you buy on a dividend day. The dividend days are Oct. 1, Jan. 1, April 1 and July 1. If you prefer, however, you may pay at the rate of $10 per share per month on the first day of each calendar month. Receipts will be issued for payments for fractions of a share, certificates for whole shares when fully paid for.

Mr. Feustel Will Check P. R. T. Appraisal

Robert M. Feustel, president of the Indiana Service Corporation, Fort Wayne, Ind., has been appointed as the representative of the city of Philadelphia in checking the inventory and appraisal of the Philadelphia Rapid Transit System. While the railway is exerting every effort to avert a financial crisis, the valuation proceedings before the State Public Service Commission are continuing.

Commissioners Benn and Clement took steps on Sept. 30 to speed up the proceedings when they ordered the minute examination of the witnesses discontinued and instructed Coleman J. Joyce, counsel for the Philadelphia Rapid Transit Company, to present all of the items that are on the inventory of the company's assets as soon as possible. Commissioner Benn urged haste on Mr. Joyce and suggested that lawyers in the city and company cooperate to the fullest extent.

The Superior Court has postponed to Oct. 18 hearing on arguments on the question as to whether the Public Service Commission has the power to probe the matter of rentals paid to the Union Traction Company and other Philadelphia Rapid Transit Company subsidiaries.

Common Stock Dividend Reduced

The directors of the American Light & Traction Company, New York, N. Y., on Oct. 6 cut the common cash dividend of the company to 1 per cent for the quarter. The stock dividend declared on the common was 1¾ per cent., which was unchanged from the July 6 declaration. The cash declaration on the common as of that date was 1¾ per cent. The regular quarterly dividend of 1½ per cent was declared on the preferred. All of the disbursements are payable Nov. 1 to stockholders of record Oct. 15.

Before the July 6 declarations the company had paid 2½ per cent in cash and 2½ per cent in stock on the common shares.

Fare Increase Fails

Seattle Municipal Railway Still Going Behind Despite Recent Fare Advance

Mayor Hugh M. Caldwell of Seattle, Wash., in a statement about the jitney situation in Seattle, predicts a further increase of fare on the Seattle Municipal Railway unless some other means is found to increase the revenue. In discussing the jitney situation, Councilman Drake declared that elimination of the jitneys would increase the receipts of the railway $80,000 to $100,000 a month. Mayor Caldwell took exception to this. He declared that during the two or three days jitney service was stopped by the city authorities in their attempt to enforce the jitney regulation ordinance the average daily increase in receipts on the railway was only $300.

CITY TREASURER GROWING CAUTIOUS

The Mayor's assertion that the finances of the railway are in bad shape despite the recent increase in fares was confirmed by other city officials. Attention was called to the fact that the department has asked for $513,435 to defray operating expenses during the month of October. This sum is only $17,401.32 less than the receipts during the first month under the increased fare. It included no allowance for interest, redemption or depreciation, covering only expenditures for salaries, wages, materials and supplies.

Reports from the city treasurer's office, councilmen said, showed that the average daily overdraft on the city railway has not been reduced by the increase in fare. The treasurer's records showed an overdraft of $392,736 on this fund for one day. On July 23, the day before the increased fare went into effect, the overdraft was $324,000. Since that time the overdraft fluctuated from $264,000 to $514,000.

NEWSPAPER ISSUES WARNING

The Seattle *Times* in the course of a column editorial said recently:

> The jitneys must go or the bankruptcy of the municipally-owned street car system is certain.
>
> And, if the latter "goes broke," the municipality will be extraordinarily fortunate if it does not follow the same road.
>
> These were the outstanding facts developed at yesterday's conference on the street car situation between Mayor Caldwell and the City Council.
>
> It is not the purpose of the *Times* to adopt a critical attitude toward the municipal authorities.
>
> They are desperately striving to put Seattle's "white elephant" on a paying basis.
>
> In this effort, they need all the encouragement and constructive assistance public-spirited men can offer.
>
> But this newspaper earnestly counsels both the Mayor and the City Council to face this outstanding fact:
>
> They are not SOLVING the problem at all.
>
> They merely are straddling two stools and inevitably are due to fall!
>
> The city cannot support two transportation systems.
>
> The street cars must be removed from the streets in order that the jitneys may prosper; or
>
> The jitneys must be barred in order that the car lines may live.
>
> There is no middle ground.
>
> THE JITNEYS MUST GO!

Rochester Has Deficit

Only Four Days of Operation at Service-at-Cost Are Included in August Figures

The income statement of the New York Railways, Rochester Lines, for August was submitted to Mayor Edgerton and the Common Council on Sept. 28 by Charles R. Barnes, city commissioner of railways. A deficit of $71,525 was created in August, notwithstanding that the month included four days of operation under the 7-cent fare.

The service-at-cost contract became effective on Aug. 1 but the increased fare did not go into force until Aug. 28. Commissioner Barnes points out in his report that had the increased fare been in force throughout the month there would not have been a deficit. His report follows:

The following is the income statement for the month of August:

Revenues from transportation:		
Passenger revenues	$355,958	
Chartered car revenues	1,128	
Miscellaneous	146	
		$357,232
Revenue from other railway operations:		
Station and car privileges	$3,189	
Rent of track and facilities	1,294	
Rent of buildings and other property	686	
		$5,170
Railway operating revenues		$362,402
Railway operating expenses:		
Ways and structures	$31,242	
Equipment	42,712	
Power	23,462	
Conducting transportation	159,436	
General	36,280	
Depreciation	29,166	
		$322,701
Net revenue from railway operations		$39,701
Auxiliary operation revenues	$1,614	
Auxiliary operation expenses	564	
		$1,049
Net revenue		$40,751
Taxes assignable to operation		23,276
Gross income		$17,474
Return to the company		89,000
Deficit for August		$71,525

In commenting on the earnings, Mr. Barnes said:

> The above income statement is compiled from the accompanying detailed report of operation, and with a 5-cent fare shows a deficit for the month of August of $71,525. Included in the revenue for transportation of $357,232 are four days of operation at a 7-cent cash and a 6½-cent ticket fare. Had the fare been 7 cents during the whole of the month the deficit of $71,525 would not appear.
>
> The revenues in the above statement have been carefully checked by the auditing department of this office, payrolls have been examined and verified, vouchers for every item of expense in the detailed report have been audited both as to quantity and price, all of which has been done under my personal supervision. Therefore, I am able to verify these statements setting forth the results of operation for the month of August, 1920, of the New York State Railways within the territory affected by the contract.

Pacific Electric Improves

For the month of June, 1920, the Pacific Electric Railway, Los Angeles, Cal., showed a net loss of $28,269 compared with a loss of $147,671 for the month of June. The total net loss of the first six months of the year was $653,567. The total loss for the five years to last May 31 was $12,189,781. During 1919 the loss was $2,767,726; in 1918 it was $1,778,192, while in the years 1914, 1915, 1916, and 1917 the loss ran from a low $467,220 to $885,116. Wages in 1919 were $6,232,105 for 276 fewer men than were employed in 1915, when the wages were $3,610,942. It is estimated that the loss this year will be $2,364,656. This does not include expense of $400,000 for paving.

EARNINGS OF PACIFIC ELECTRIC RAILWAY FOR JUNE

Passenger revenue	$870,083
Freight and switching revenue	338,175
Other revenue	62,822
Total railway operating revenue	$1,271,080
Way and structures	133,482
Equipment	148,941
Power	147,631
Conducting transportation	364,477
Traffic	21,192
General and miscellaneous	90,627
Transportation for investment—Cr.	1,894
Total railway operating expenses	$904,456
Net operating revenue	366,624
Taxes assignable to railway operations	49,735
Operating income	$316,889
Non-operating income	9,035
Gross income	$325,924
Deductions from gross income,	
Interest on bonds and other debt	294,918
Rents and miscellaneous income debentures	36,752
Depreciation	22,523
Total deductions from gross income	$354,193
Net income transferred to profit and loss	*$28,269
Net income for six months ended June 20, 1920	*653,567

*Deficit.

Court Agrees to Name Receiver

Judge Clarence Murphy at Hamilton, Ohio, on Sept. 27 rendered a decision in the suit of the Citizens Savings Bank & Trust Company, trustees, Cleveland, against the Cincinnati & Dayton Traction Company and twenty-eight other defendants seeking a foreclosure of mortgage and appointment of a receiver. Argument was heard last July.

The Cincinnati & Dayton Traction Company bought at a foreclosure sale in 1917 all the property of the Cincinnati, Dayton & Toledo Traction Company, subject to underlying mortgages amounting to $2,300,000. Holders of these mortgages brought action for foreclosure.

The court ruled that the property subsequently acquired by the consolidated company was not subject to the mortgages of the constituent companies, except where the original tracks were removed to property subsequently acquired, and that they did not constitute a lien upon equipment acquired later, except when the equipment of the consolidated company became mingled with and part of the equipment of the constituent companies.

It was further held that the mortgagees were entitled to judgment and foreclosure upon the property upon which mortgages are predicated, and, as this property is probably insufficient to pay the mortgage debt, that the mortgagees are entitled to a receiver. The receiver will be named later.

Abandonment Opposed

City of San Francisco Operates Switching Service on Ocean Shore Railroad

A petition asking permission to dissolve the Ocean Shore Railroad, a steam line running from San Francisco down the coast about 38 miles, was filed with the California Railroad Commission on Sept. 13. The grounds given were that the road had incurred a deficit of $364,187 during the past seven years because of the progress of automobile passenger and freight traffic between points which it also served and that no relief from the present unprofitable situation could be found. The road recently ceased operations entirely as mentioned in the ELECTRIC RAILWAY JOURNAL for Sept. 11.

In the hearing before the commission the auditor testified that assessments totaling $1,100,000 had been collected from the stockholders in an effort to put the road on a paying basis, but that the road has not shown a profit since 1912. He also said that rates were now as high as they could be and that an increase would tend to reduce further shipments over the line and would add to the deficit that has been accruing.

Proposals for tearing up the rails and constructing a private roadway for auto trucks have been considered. The Railroad Commission has announced an investigation in the hope of finding some way of enabling the railroad to continue operation. Shippers along the line protest against the discontinuance of service. The hearing was continued to Oct. 1.

Meantime, in order that the industries in San Francisco served by spurs from this line should not suffer, the city has secured a thirty-day permit for operating the electrified division of the system. This includes the main line tract from Army and Kansas Streets to the Twelfth and Market Streets depot and about sixteen sidings at industrial plants. All freight and passenger traffic on this part of the company's system has always been handled electrically, no permit having been issued for operation of the company's steam equipment inside the city limits.

The operation which the city has taken over, under the direction of its municipal railway department, is purely a switching service, requires only one freight crew and now includes the handling not more than 100 cars a month.

Municipal Road Still Going Behind

In connection with the announcement made at Attleboro, Mass., on Sept. 29, that a 10-cent fare will go into effect on the municipally owned Norton, Taunton & Attleboro Railway, the present zones being maintained, it was also announced that there is a deficit of about $25,000 under municipal operation since last fall.

The Kansas City Railways Receivership and Its Causes

Accumulated Deficit Overcomes Bondholders' Faith as Improvement in the Situation Seems at Hand—Company Suffered from Increased Costs and Failure of Authorities to Increase Fares

The trouble with the Kansas City (Mo.) Railways, now in receivership, is obvious enough—its gross revenue has been insufficient to keep pace with growing expenses. This fundamental has been greatly accentuated by the unfortunate labor conditions with which the company has had to contend during the last three years. The first of three strikes within a period of eighteen months occurred in August, 1917, and lasted ten days. The immediate cause of this was the unionization of the property.

OPERATING RATIO KANSAS CITY RAILWAYS

	1917–18 Per Cent	1918–19 Per Cent	1919–20 Per Cent
July	75.08	84 29	104 83
August	97.76	82 70	95 87
September	74.94	85.00	96.21
October	78.55	93.88	92.58
November	84.19	93.26	103.67
December	94.87	130.00	98.03
January	90 91	193.52	94 05
February	94.99	133.59	92 27
March	97.98	101.86	90 50
April	75.60	101.68	90 47
May	87.64	96.10	91.50
June	87.60	119.14	98.90
Average	86.16	106 34	95.74
July, 1920			86.50

The second strike took place in March, 1918, and was one with which the company had nothing whatever to do. It was brought about by local unions in sympathy with a strike of laundry workers which had been going on for some time. On this occasion the trainmen were out for a period of five days and came back without any concessions by the company. The most disastrous strike, and the one to which the present receivership may fairly be attributed, occurred Dec. 11, 1918. It was caused primarily by the union breaking its contract and refusing to abide by the decision of the War Labor Board. The receivership occurred since the abstract of the report of Mr. Woods, published elsewhere in this issue, was prepared.

$180,000 IN JUDGMENTS

The immediate cause of the receivership, if indeed any one thing can be assigned the immediate cause, was the necessity to meet judgments amounting to $180,000 rendered against the company in the last term of court, or put up $360,000 of appeal bonds to cover. The company's earnings have been used to pay off other pressing obligations; and in view of the accumulation of debt as noted in Mr. Woods' report, and the unfortunate financial showing made in June, no one felt optimistic enough to advance the cash necessary to secure these judgment appeals. Immediate action was necessary as the term for filing appeals was drawing to a close and receivership proceedings were accordingly brought.

NO NEW FACTORS

No new factor was interjected at this time that could change what had been known for many months as to expected earnings and expenses. A budget prepared by the operating officials for the Bondholders' Protective Committee, formed a year ago, stated that the net for the calendar year, 1920, would approximate $1,000,000. The experience of the first nine months of this year under this budget has shown that this estimate will be almost exactly realized. A new and detailed budget made in May, taking into account every classification of accounts, showed an expected net for the last six months of the calendar year of $600,000, and this estimate will be realized.

The fiscal year ended June 30, 1920, was completed with a deficit including taxes and all fixed charges of $1,599,812, the net revenue above operating expense and taxes having been $420,021. The July, 1920, statement, in spite of the wage increase effective on June 1, showed a net of $73,516 as against a budget estimate of $64,377.

On the basis of May coal and labor prices, this July showing would have included a net of $130,000, this giving a measure of the increase in gross revenue.

Comparing the results of the fiscal year ended June 30, 1920, with that of 1919, a considerable improvement is noted. For the year ended June 30, 1919, the company failed to earn operating expenses and taxes by $509,339, so that the net of $420,021 for 1920 would indicate an improvement of $929,360. Another evidence of the general improvement in the financial conditions of the company may be observed by comparing the statements for the last three six-month periods. For the six months ended June 30, 1919, the net operating income was recorded as a deficit of $838,249. For the six months ended Dec. 31, 1919, there was a net income of $88,149, while for the six months' period ended June 30, 1920, the net income was $298,901.

The Kansas City Railways has suffered from the same situation that has been the cause of precipitating receiverships generally throughout the country

GROSS OPERATING REVENUE (INCLUDING AUXILIARY REVENUE) WITH TOTAL OF OPERATING EXPENSES, AUXILIARY EXPENSES AND TAXES, KANSAS CITY RAILWAYS

(Last 000 revenue and expense figures omitted)

1917	Revenue	Expenses	Fare, Cents
July	$689	$517	5
August *	522	510	5
September	685	513	5
October	704	552	5
November	679	571	5
December	714	679	5
1918			
January	635	578	5
February	598	568	5
March **	603	592	5
April	722	554	5
May	722	634	5
June	700	553	5
July	775	653	5
			(up to July 16)
August ***	811	671	6
September	767	652	6
October	696	652	6
November	679	632	6
December****	477	624	6

* Strike Aug. 8 to Aug. 17.

** Strike Mar. 29 to Apr. 3.

*** Aug.-Nov.-Revenue affected by influenza epidemic and coal shortage.

**** Strike commencing Dec. 11, 1918, effects of which on revenue were not overcome until May, while expenses were affected for a much longer time.

1919	Revenue	Expenses	Fare, Cents
January	$467	$905	6
February	528	705	[illegible]
March	653	665	6
April	677	691	6
May	758	820	6
June	727	868	6
July	716	752	6
August	781	751	6
			(up to Aug. 20)
September	820	790	7
October	969	897	7
November*****	815	845	7
December	877	860	7
1920			(up to Dec. 14)
January	873	821	8 cash, 2 tickets 15c. 5 tickets 35c.
February	798	735	
March	888	807	
April	881	797	
May	931	852	
June	977	1,038	
July	943	870	

***** From Nov., 1919—Mar., 1920, both revenue and expenses were affected by influenza epidemic and coal shortage, due to strike

WAGES OF TRAINMEN OF KANSAS CITY RAILWAYS

	Aug. 1, 1917*	July 16, 1918	March 1, 1919
First six months	25 cents	30 cents	35 cents
Second six months	26 cents	31 cents	36 cents
Second year	27 cents—one uniform	32 cents—one uniform	37 cents
Third year	28 cents—one uniform	33 cents—one uniform	38 cents
Fourth year	29 cents—one uniform	34 cents—one uniform	39 cents
Fifth year	30 cents—one uniform	35 cents—one uniform	40 cents
Sixth year and over	33 cents—two uniforms	38 cents—two uniforms	40 cents
	$60 minimum	$60 minimum	One-man car, 2½ cts. add.
*Agreement Nov. 12, 17.	One-man car, 2 cents add.	One-man car, 2 cents add.	$75 minimum

	July 1, 1919	10–16–1919	6–1 20
First three months	40 cents	45 cents	55 cents
Next nine months	42 cents	47 cents	52 cents
Second year	43 cents	48 cents	53 cents
Third year	44 cents	50 cents	55 cents
Fourth year and over	45 cents	50 cents	55 cents
Mail cars	4 cents add.	4 cents add.	
One-man cars	5 cents add.	5 cents add.	55-60 (cents
	$85 min.	$105 min.	$110 min.

in the traction industry; namely, the failure of public authority to grant fare increases promptly enough to care for the rapidly mounting expenses. This is particularly well illustrated by the comparison of the actual deficit for March, April and May, 1920, with what the operating results would have been provided fuel and labor prices had remained the same as in August, 1919.

The deficit is seen to check almost exactly with the increased cost of fuel and labor, this fact incidentally pointing to the accuracy of the rate of fare set up by the commission, had prices in effect when the rate was made remained the same. The increase in the total operating expenses of the company since 1916 has been 110 per cent in spite of the fact that, based on 1916 prices for materials and labor, the present operation of the property is 10.7 per cent more economical than in 1916. On the other hand, the increase in fare since 1916 has been only 48 per cent, the fare in 1916 having been 5 cents and the present average fare per revenue passenger 7.4 cents.

TABLE OF FARE INCREASES OF KANSAS CITY RAILWAYS

(*a*) 5 cents to 6 cents in Missouri only, July 16, 1918.
(*b*) 5 cents to 6 cents in Kansas, April 17, 1919.
(*c*) 6 cents to 7 cents in Missouri only, Aug. 20, 1919.
(*d*) 7 cents to 7, 7½ and 8 cents, Missouri only, Dec. 14, 1919.
(*e*) Extra 1 cent collected from interstate Kansas-to-Missouri passengers at state line, Nov. 11, 1919.
(*f*) 6 cents to 7, 7½ and 8 cents in Kansas, Jan. 4, 1920, abolishing (*e*).
Present results: 10 per cent cash fares; 72 per cent 7½ cent ticket fares; 18 per cent 7 cent ticket fares.
Average rate of fare now received, 7.46 cents.

EARNINGS OF KANSAS CITY RAILWAYS FOR SIX-MONTH PERIODS

	6 Months Ended June 30, 1919	6 Months Ended Dec. 31, 1919	6 Months Ended June 30, 1920
Transportation revenue	$3,061,483	$4,130,237	$4,567,434
Other revenue	46,320	55,298	57,187
Miscellaneous income	5,604	9,410	20,256
Total	3,113,408	4,194,947	4,644,878
Operating expenses:			
Way and Structure	$307,546	$390,373	$328,366
Equipment	674,482	581,753	552,920
Power	626,765	696,581	738,871
Transportation	1,702,428	1,682,866	1,708,168
Traffic	729	3,379	12,737
General and miscellaneous	459,289	630,999	769,689
Total operating expense	$3,771,242	$3,985,955	$4,110,853
Taxes	258,842	262,961	320,022
Total operating expenses and taxes	$4,030,084	$4,248,916	$4,430,875
Net operating revenue	* 916,676	* 53,969	214,002
Auxiliary operating revenue	701,857	787,364	705,100
Auxiliary operating expenses	623,430	645,245	620,201
Auxiliary net revenue	$78,426	$142,118	$84,898
Net operating income	* 838,249	88,149	298,901

*Deficit

TRAFFIC STUDY HELPFUL

Of the things which are contributing to this more economical operation, perhaps the most important is the work which has been done by John A. Beeler in relieving the congestion in the business center by revising the number and location of car stops, double-berthing of cars, use of loading platforms, etc. This has contributed materially to the increase in the system average schedule speed from 8.9 miles per hour to 9.2 miles per hour. A material rearrangement of schedules by which short looping and turnbacks have been inaugurated has enabled the company to keep the cars working in the thickly built-up districts, thus providing what in reality amounts to about 20 per cent more service than was formerly derived from the same number of cars.

$1,000,000 A YEAR TO THE JITNEYS

Following the strike in August, 1917, the jitneys, which prior to that time had shown a tendency to disappear, were again revived. They were not a serious menace, however, until the first fare increase in July, 1918, gave them encouragement. The strike in December, 1918, brought them out in constantly increasing numbers, and the other fare increases also served to induce more jitneys to go into the business. As a result, the company for the past year and a half has been losing, according to various estimates and checks, from $2,500 to $3,000 a day through this form of competition. Approximately 500 jitneys are today operating in Kansas City and have been for the past year.

They have a well organized association, they are powerful politically, and are well intrenched. Ordinance regulations defining bonds, restrictions, etc., have been loosely applied, so that their effect has been practically nothing and jitney competition, as a result, is unrestrained. The effect of this has been to deprive the company of approximately $1,000,000 in revenue for the past fiscal year ended June 30, 1920, which would have reduced the company's deficit to in the neighborhood of $500,000.

THE OUTLOOK

Despite the discouraging factors which have brought about the present situation, indications point out that with proper support, and with the carrying out of plans already formulated and ready for execution, the property can be put upon a self-sustaining basis in the near future. For example, a rerouting plan now before Council, in addition to providing better service where it is most needed, will make possible a saving in operating expenses of at least $620,000 a year. In addition, there is now pending before the Missouri Public Service Commission an application for a 10-cent cash fare with three tickets for 25 cents. This, it is expected, would substantially improve the gross earnings of the railway company.

This application provides for a sliding

STATEMENT OF INCOME OF KANSAS CITY RAILWAYS FOR ELEVEN MONTHS ENDED JUNE 30, 1920, AND FOR JULY, 1920

	August 1919	September 1919	October 1919	November 1919	December 1919	January 1920	February 1920	March 1920	April 1920	May 1920	June 1920	Year Ended June 30, 1920	July 1920
Transportation revenue	$640,858	$672,400	$825,820	$707,782	$692,812	$732,598	$684,702	$779,512	$766,120	$807,790	$796,709	$8,697,672	$800,204
Other revenue	7,847	9,789	11,596	8,790	9,523	11,027	8 991	9,274	9,143	8,776	9,974	112,486	4,357
Miscellaneous income	1,510	1,204	1,823	1,767	1,776	1,865	1,973	2,052	3,451	*316	11,230	29,666	11,557
Total	650,217	683,394	839,241	718,340	704,112	745,490	695,667	790,839	778,715	816,249	817,914	8,839,825	816,119
Operating expenses:													
Way and structures	66,189	83,882	79,787	60,989	40,878	23,892	29,163	47,573	50,112	83,061	91,762	715,940	72,837
Equipment	86,536	90,958	102,516	93,639	129,651	87,847	84,574	111,105	87,264	87,055	95,073	1,134,674	87,919
Power	107,391	95,242	117,960	132,206	135,107	124,555	110,462	109,535	119,779	117,890	156,648	1,435,452	128,016
Transportation	266,960	268,012	291,238	300,622	289,147	290,350	269,141	284,213	270,081	283,899	310,607	3,391,161	305,012
Traffic	341	556	1,692	455	332	6,786	3,368	593	755	398	835	16,117	473
General and miscellaneous	67,297	98,617	135,311	116,474	117,631	114,021	101,797	116,121	122,460	122,055	167,721	1,375,178	113,426
Total operating expenses	594,717	637,269	728,507	704,388	712,748	647,453	598,508	669,142	650,454	694,361	822,648	8,068,523	707,685
Taxes	43,318	44,719	47,999	46,692	37,052	53,508	51,911	52,940	53,887	53,887	53,887	582,983	53,887
Total operating and taxes	$638,035	$681,988	$776,506	$751,081	$749,800	$700,961	$650,419	$722,083	$704,341	$748,248	$876,536	$8,651,507	$761,572
Net operating revenue	$12,181	$1,406	$62,734	*$32,741	*$45,687	$44,529	$45,248	$68,756	$74,374	$68,001	*$58,622	$188,318	$545,546
Auxiliary operating revenue	132,773	138,083	129,456	96,601	172,580	127,271	101,115	99,573	102,613	114,975	159,552	1,492,465	127,597
Auxiliary operating expense	112,646	108,342	120,041	93,682	109,746	119,917	84,832	85,381	93,031	103,819	133,219	1,265,447	108,627
Auxiliary net revenue	$20,126	$29,741	$9,414	$2,919	$62,834	$7,354	$16,282	$14,191	$9,581	$11,156	$26,332	$227,017	$18,969
Net operating income	$32,308	$31,147	$72,149	$29,822	$17,146	$51,883	$61,530	$82,948	$83,955	$79,157	*$32,289	$415,335	$73,516

*Deficit.

scale of fares adjustable every sixty days to take care of variations in the cost of coal and labor. The case is in and no opposition was introduced, the company's figures having been admitted. While no one can say what the commission will do, it is felt that it must grant some relief.

As a further reason for optimism, negotiations for power are now under way with the Kansas City Power & Light Company, which, when consummated, are expected to result in a substantial saving for the railway in its power costs.

The city is beginning to realize that the competition of jitneys has a direct effect upon the rate of carfare, and that it means that a penalty must be imposed upon the 350,000 daily streetcar riders in order to provide jitney service for from 40,000 to 50,000. This revenue alone would increase the company's gross income approximately $1,000,000 a year.

Furthermore, the riding habit is improving, due, no doubt, in large measuse, to the improved service. Another favorable circumstance is the fact that the peak in material and labor prices has probably been reached and passed.

The winning of the 1918 strike and the reorganization, while exceedingly costly at the time, are not without compensation. With normal service restored and normal operating conditions practically obtaining, department heads throughout the company now feel that the morale of the employees is better than they have ever known it to be before, and that this labor situation is about to bear fruit in great advantage to the company. Inasmuch as a loyal and efficient operating force is the key to success on any property, it seems that the company should now be in a position to give a service that would attract patronage and reduce unit operating costs.

Valuation Report Near Completion

The Public Utilities Commission of Connecticut has practically concluded its task of placing a valuation on all electric railways in the State of Connecticut. Until the report is complete the facts will be withheld from the public. Consideration is being given to the average prices of all equipment for the period of 1910-1914 and the cost of things as of Dec. 31, 1919. Those working on the valuation work are E. Irvine Rudd, chief engineer; Joseph P. Wadhams, assistant engineer, and A. E. Knowlton, electrical engineer of the utilities commission. Mr. Knowlton is assisted by Prof. Charles F. Scott, Prof. L. P. Breckenridge and R. G. Warner of Yale University.

Interest Payment Postponed

The board of directors of the Denver (Col.) Tramway has announced the postponement of the interest payment on the $2,500,000 of outstanding notes of the company. Changes in the personnel of the company are announced elsewhere in this issue.

Financial News Notes

Receivership Hearing Again Postponed.—The hearing set to be held before the Federal court in Kansas City, Mo., on Sept. 30, on the matter of the appointment of a permanent receiver for the Kansas City Railways, and which was postponed until Oct. 14, has again been postponed until Oct. 21. Frank C. Niles was appointed temporary receiver on Sept. 9.

Sale at Foreclosure Ordered.—The property of the Norfolk & Bristol Street Railway, a Massachusetts corporation, will be sold at public auction in Walpole, Mass., on Oct. 23, 1920. It is to be offered for sale at the behest of the American Trust Company, representing holders of bonds of the company secured by a mortgage against the property.

Illinois Road Sold.—The Aurora, Plainfield & Joilet Railroad has been authorized by the Illinois Public Utilities Commission to sell its electric interurban line to the Aurora, Plainfield & Joliet Railroad for $757,000. The transfer was consummated on Oct. 1. The buying company assumes the accounts payable and obligations of the selling company.

Tax Valuation Announced in Wisconsin.—The twenty-three electric railways in Wisconsin were valued by the Wisconsin Tax Commission at $71,000,000 this year as compared with $69,417,000 last year. The companies will pay $1,352,498 in taxes this year as compared with $1,015,640 last year. The Milwaukee Electric Railway & Light Company was assessed by the State Tax Commission at $40,000,000 and will pay $758,137 in taxes for the year.

Missouri Short Line to Readjust Capital.—The Kansas City, Clay County & St. Joseph Railroad, Kansas City, Mo., has applied to the State Public Service Commission for authority to reclassify its capital stock of $10,000,000. Only $4,000,000 of the stock so far has been issued, the petition stated. It is proposed to issue $3,000,000 of cumulative preferred stock bearing 7 per cent dividends, of which $1,450,000 is to be held for future issue, and to issue $7,000,000 of common stock. Of the common stock, $2,450,000 is to be reserved for future issue, according to the petition.

Sale Under Foreclosure Confirmed.—George Whysall, receiver of the Springfield Terminal Railway & Power Company, Springfield, Ohio, has filed in the United States District Court his report of the sale of the properties of the company to W. P. Sturtevant, representing the stockholders, for $300,000, the upset price fixed by the court. The decree of U. S. District Judge John E. Sater, confirming the sale, also has been filed along with an order of court authorizing the receiver at once to pay off $14,000 in receiver's certificates issued to meet operating deficits, together with accrued interest.

Resolutions Adopted Revoking Franchise.—Resolutions have been adopted by the Board of Estimate of New York revoking all the franchises of the Richmond Light & Railroad Company, Staten Island, N. Y. The resolutions were presented by Commissioner Whalen of the Department of Plant and Structures, who pointed out that the ninety-day period had expired which was required since the company and its temporary receiver had been notified by the city of forfeiture of its franchises because of failure to provide adequate service. Under an injunction of the Federal court the city is prevented from interfering with the company's cars, tracks, etc., but it is stated that the city will now ask that the injunction order be rescinded.

Reno Company Abandons Franchise Rights.—A written release abandoning certain franchise rights it has enjoyed in the city of Reno, Nev., has been filed with City Clerk Sullivan by the Reno Traction Company. The release abandons all rights to exercise the privilege of maintaining electric railway service on Second Street from Sierra to the west city limits; Sierra Street from Fourth to Ninth and Ninth from Sierra to Center; from the intersection of Second and Virginia to Moran Street, thence westerly on Moran to Wells Avenue and on Wells Avenue to Cheney Street; on California Avenue to Plumas Street and on Plumas Street to Reno Avenue at the south city limits. These are presumably the rights included in the order of service abandonment approved by the Public Service Commission as noted in the ELECTRIC RAILWAY JOURNAL for Sept. 4, page 477.

Electric Operation Discontinued.—The electrical equipment left on the Rock Island (Ill.) Southern Railroad will be discarded and all trains operated by steam or gasoline, according to an order of the Illinois Public Utilities Commission. An order has also been issued for the company to sell its power house, poles, wires and other equipment. The order comes as the result of the hearing in Rock Island before an examiner of the commission. Receivers of the Rock Island Southern Railroad were cited to show cause why an order of the commission for rehabilitation of its service issued in November, 1919, had not been complied with. The plea was that the company's financial condition would not allow it to rehabilitate its lines properly with electrical equipment. Gasoline cars were suggested as a solution to the difficulty and will probably be tried. For the last year trains have been operated by steam. The receivers have filed a petition with Federal Judge Louis FitzHenry asking permission to borrow funds for the rehabilitation of the road.

Traffic and Transportation

Syracuse Plea Made

New York State Railways Asks Immediate Action Looking Toward Financial Relief

Benjamin E. Tilton, general manager of the Syracuse lines of the New York State Railways, has issued a statement in which he says the Syracuse unit is running behind $1,000 a day and that the company has the right to ask for immediate action in the matter of relief. Mr. Tilton says that the company was called upon to make an expenditure of $20,000 in supplying information in connection with the investigation referred to in the issue of the ELECTRIC RAILWAY JOURNAL for Sept. 25, page 610, and that in carrying out agreements with the city the company has sustained a loss of $150,000.

LOCAL SETTLEMENT FAVORED

Last February it was decided by the Mayor of the city to appoint a committee of citizens to look into the whole matter of transportation in the city and report back to the Mayor and Common Council, the idea being at that time that the matter should be settled locally as it was strictly a problem which is the concern of the citizens of Syracuse.

The New York State Railways was asked at that time to place the determination of its case as to revenue and valuation in the hands of this commission, giving the fullest co-operation possible. Since the formation of the commission the company has been called upon to make an expenditure of $20,000 in supplying information in connection with the investigation. It has also been called upon to bear the cost of the increases in wages granted by the arbitration board to the employees amounting to $25,000 a month, or $300,000 a year.

The company has, therefore, in carrying out its agreement with the city to co-operate to the fullest extent with the commission, sustained a loss of $150,000 to date and is at present running behind in bond interest at the rate of $1,000 a day.

ASKS DECISION ON MERITS

Now that the work of the commission has been concluded and the report submitted, the company feels that it is justified in asking that immediate consideration of its case, at least as to fares, should be given on its merits. All facts that enter into the determination of the fixing of a rate according to law have been made available.

The matter may be settled in one of three ways—locally, by appeal to the Public Service Commission or by curtailment of service to a sufficient degree to make up the loss.

As regards the comparisons made in the newspapers between the valuation of the Syracuse lines and the valuation of the Rochester lines, Mr. Tilton points out that they are entirely unfair for the reason, first, that they are incorrect, and, second, that they do not take into account the comparison of the property included in the two amounts, an omission which obviously destroys the value of such a comparison. Mr. Tilton said:

> To make a true comparison, if the matter in Syracuse is to be settled by comparisons with other cities, an adjustment would have to be made as between the very much greater mileage of unpaved tracks in Rochester as against Syracuse. While we are not going to get anywhere by making comparisons with other cities, it is only fair, in view of the fact that these comparisons have been made here, to state that the difference in cost between the paved and unpaved track is $10 a foot, and that there are 67 miles of unpaved track covered under the Rochester contract and only 24 miles covered under the Syracuse contract.
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> This difference would add approximately $2,000,000 to the Rochester valuation in order to bring it on the same basis as Syracuse, which is approximately $117,000 a mile instead of $100,000 a mile as has been given to the public as the tentative Rochester valuation.
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> It has also been stated that this company has spent practically nothing for additions or improvements to its Syracuse lines since 1917. The fact is that the following expenditures for improvements and additions have been made:
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> In 1917, $491,630; in 1918, $283,147; in 1919, $325,838.
>
> During that period 12 miles of track have been replaced.

Fast Train on North Shore Line

"The Badger Limited" is the name of a new fast train which the Chicago, North Shore & Milwaukee Railroad has recently installed for the particular convenience of business men out of Chicago to Kenosha, Racine and Milwaukee in the morning and back in the evening. The road now operates a limited train every hour between Chicago and Milwaukee which makes the run in two hours and thirty-five minutes.

It was found that the largest number of through passengers were carried on the 9 o'clock and 10 o'clock morning trains, northbound, and on the 4 o'clock and 5 o'clock afternoon trains southbound from Milwaukee. The new train, scheduled to make the run with only the two intermediate stops indicated above, in two hours and fifteen minutes, was therefore timed to leave Chicago at 9:30 a.m., arriving at Milwaukee at 11:45; and on the return trip, leaving Milwaukee at 4:30 p.m. and arriving at Chicago at 6:40. The running time indicated is the total time required for the run between the Adams and Wabash Elevated Station in Chicago, over the structure to Wilmette, through the streets of some of the Nort Shore towns and to the new terminal at Sixth and Sycamore Streets, Milwaukee, Wis. This is a distance of 86 miles, giving an average schedule speed for the run of practically 40 miles an hour.

Voters Refuse Relief

Six-Cent Fare Ordinance Again Defeated at Duluth—Union Labor Blamed for Failure

The voters of Duluth, Minn., at a special municipal election on Oct. 4, refused to ratify the referendum ordinance granting to the Duluth Street Railway the right to charge 6 cents instead of 5 cents on its city lines. The ordinance was lost by 637 votes. The vote was 7,561 for and 8,198 against the measure.

A similar 6-cent fare ordinance was defeated at a special city election held on primary election day, June 21. At that time the fare proposition was rejected by 1,297 votes, the poll being 6,076 for and 7,373 against. An amendment to the city charter granting the Council the right to levy on a rate of 16 mills for municipal taxes, instead of 13 mills, which was decisively defeated at the primary election in June, was carried by a substantial majority at the Oct. 4 election. The vote on this measure was 10,655 for; 5,042 against.

Upon learning the result of the election, Herbert Warren, vice-president and general manager of the railway, gave out a statement in which he said:

> The company and its employees are, of course, very much disappointed in what seems to be the defeat of the ordinance by a majority of some 600 votes. Since the ordinance has been defeated I can see no other possible course for the company than to make the best of the situation by giving as much and as good a service as is possible under a 5-cent fare. All extensions and improvements requiring the expenditure of cash will necessarily have to be indefinitely postponed. All I can say at this time is that the company will do its best under the circumstances.

WAGE INCREASE PROMISED

The rejected ordinance provided that the company should share with its employees the additional revenue obtained by the additional cent in fare. The management had promised all employees an increase in wages of 10 per cent, retroactive to July 1, in case that ordinance carried. An intensive campaign to "put across" the ordinance was waged by a publicity committee of the carmen's association.

Union labor is credited with having turned the tide against the proposal. Voters in the industrial end of the city voted almost solidly against the increase. The unfriendly feeling of the labor element is believed to have grown out of a feud of long standing between the unions and the railway, which has not permitted its men to organize and affiliate with the American Federation of Labor.

The company announced on Oct. 7 that it would substantially reduce its service and would lay off several crews. At the same time it stated that it would raise the pay of the men retained 10 per cent. Mr. Warren declared that the number of employees would be reduced to a minimum and that all cars not "paying their way" would be taken off. Owl cars will be discontinued. The new schedule will take effect on Oct. 11.

Five Cents Flat or Failure

Mr. Mitten Appeals to Public for Immediate Relief to Save P. R. T. from Disaster—Riders Forego Free Transfers

In a desperate attempt to preserve the basic nickel fare which, a year ago, he termed his "religion," Thomas E. Mitten, president of the Philadelphia Rapid Transit Company, on Sept. 30 appealed to the people of Philadelphia to pay flat 5-cent fares. Mr. Mitten asked the car riders to forego the privilege of free transfers and 3-cent "exchanges" to save the city's transportation system from disaster. Response to Mr. Mitten's appeal on the part of the public was immediate. On Oct. 1 thousands of passengers refrained from demanding transfers. As a result of the public's stand the company's revenue for the first three days of the month was increased by a total of $20,857. As a final means of financial relief the company on Oct. 4 asked the State Public Service Commission for authority to make the 5-cent flat rate universal beginning Oct. 6, without giving the thirty days' notice ordinarily required. At a hearing before the commission on Wednesday, Mr. Mitten begged for an immediate decision. The commission, however, declined to act until it had obtained the opinion of the City Council.

MR. MITTEN asked the car rider to pay 5 cents every time he changed cars. He pointed out that the present delay in getting the straight 5-cent fare from the City Council and the Public Service Commission would plunge the company deeper into financial difficulties and that unless there was a response to the "voluntary contribution" plea, the accumulating deficit would be so great that in order to avoid bankruptcy, the company might have to ask for an 8- or a 10-cent fare.

No effort was made to force the riders to avoid asking for transfers or exchange tickets. The conductors have been instructed to give the transfer or exchange whenever it is asked for by the passenger, but great faith is being placed by the P. R. T. in the public's response to the no transfer or exchange plea.

"Will You Pay Five Cents for Each Ride Now?" is the text of the signs posted outside and inside the cars.

"FIREBRANDS" PROPOSE STRIKE

The latest move of the company to get more funds was made known by Mr. Mitten at a meeting on Sept. 29 of the Co-operative Welfare Association delegates. The meeting was called hurriedly to end talk of a strike against the public that had been urged by firebrands in the ranks of the men. Carmen, impatient at the delay in getting the higher fare that would enable the company to pay them the back wages to which they are entitled, thought to bring the fare question to a "showdown" by taking a "vacation" as a protest against continued delay in the consideration of the higher-fare proposal now before Council.

Mr. Mitten urged the men not to strike or do anything to inconvenience the riding public. He told them of his plans for the appeal to the public, and put his proposal up to them for approval.

The men, who unanimously approved the plan, were instructed to inform their associates of the manner in which the appeal to the public would be made. Officials pointed to the fact that $3,000 had been collected from persons who refused to accept transfers when the company first put the no-transfer, no-exchange up to Council. They said they expected the plea to result in the daily receipts being greatly increased. In addition, other plans to tide the company over the present difficulty are being considered.

President Mitten, in appealing for the public's aid, said:

> If P. R. T. waits longer for city consent and then files its tariff, to become effective under the law thirty days later, P. R. T.'s accumulating deficit will be too great to be overcome by the proposed 5-cent fare, without exchanges or transfers, so that P. R. T., if further delayed, will then, to avoid bankruptcy, be forced to file its new tariff for a still higher fare.
>
> P. R. T. must commence to collect the added revenue now—immediately—if the collection of an 8-cent or even 10-cent fare is to be avoided during the coming winter; 476,027 persons have signed a petition to the Mayor, City Council and the Public Service Commission, requesting necessary assent to the immediate collection of the proposed 5-cent fare, without transfers or exchanges.
>
> Since the car-riders, including these petitioners, must be later subjected to an 8-cent or 10-cent fare, in the event that P. R. T.'s looked for relief is longer delayed, P. R. T. has decided that, commencing Oct. 1, 1920, the car-rider will be given an opportunity to insure against higher fares by the voluntary payment of the proposed 5-cent fare, without transfers or exchanges. If the response is not such as to provide the increased revenue necessary to insure the continuance of the proposed 5-cent fare, without transfers or exchanges, then P. R. T. must perforce file its tariff at the proper time for a higher rate of fare.
>
> P. R. T. has confidence in the fairness of its car-riders and looks forward to a rapid reduction of requests for transfers and exchanges; thereby increasing the revenue to the volume necessary to carry the company through and justify the management in filing its tariff for not more than a 5-cent fare, without transfers or exchanges, as soon as such action can properly be taken.

The P. R. T. employees have voluntarily agreed to forego the use of their pass-books in order to aid the company. Many of the employees are paying 5 cents fare when they carry a free pass in their pockets.

The "pay-your-fare" movement of the employees started, it was said, at a meeting of sixty-five employees of the utility department. They agreed to pay their fares and not take advantage of the pass-books or the unwritten law of the company that an employee does not have to pay fare for himself or his family.

Word of that action reached the stenographers, telephone operators, clerks and executives employed at the Land Title Building offices of the company and they immediately decided to emulate the example of the mechanics. As a result, the movement has spread through the ranks of the company employees and cases of where conductors off duty insisted on paying fare for themselves and their families were reported.

APPEAL GETS RESULTS

The company announced on Oct. 3 that its appeal to car riders to forego transfers and exchanges had been successful. Furthermore, the company officials said that the entire scheme was working smoothly and that the distribution of the cards setting forth the reasons for the appeal for the voluntary payment of the straight 5-cent fare had been attended by no disorder. The statement further read:

> P. R. T. men and management are greatly encouraged by the added interest of the car riders and are now settling down to a campaign of earnest solicitation and salesmanship, fully determined to save Philadelphia from the higher rates of fare that would unquestionably follow the abandonment of the straight 5-cent plan.

A second statement was issued by the management on Oct. 4, as follows:

> P. R. T.'s increased earnings resulting from the voluntary disuse of transfers and exchanges for Sunday, over the Sunday preceding, were $9,591, as against the increase of Saturday, the second day, of $6,697, and Friday, the first day, of $4,569.
>
> The campaign of the men and management to retain the straight 5-cent fare for Philadelphia is now on in real earnest, and the car rider is responding in a truly wonderful way.
>
> The management is limiting the men to a campaign of solicitation and salesmanship. If, however, there be instances where the men become over-zealous the kindly consideration of the public is bespoken, as much may be forgiven these men when they express their feelings in an effort to collect the money necessary to keep the fare down and the cars running, as compared to the old-time practice of tying up the service to enforce their demands.

It was announced on Oct. 4 that Robert M. Feustel, president of the Indiana Service Corporation, Fort Wayne, Ind., had been appointed as the city's representative in checking up the inventory and valuation of the P. R. T. property. There was also a postponement until Oct. 18 of the argument before the Superior Court on the question as to whether the Public Service Commission has a right to probe into the rentals paid to the underlying companies.

Buses Perplex Seattle Authorities

Mayor Hugh M. Caldwell of Seattle, Wash., in a recent letter to the City Council, expresses the strongest opposition to the proposal to hold a special referendum on general election day, Nov. 2, to obtain the expression of voters on two jitney bills, one barring jitneys from the downtown section of the city and the other an initiative bill drawn by the jitney men, which would allow operation of buses on the jitney men's own terms. The Mayor favors the present jitney ordinance over either of the two proposed measures. Court cases on the present ordinance are pending to determine the right of the Council to refuse to issue licenses under an ordinance which expressly authorizes the operation of jitneys under bona fide regulations to be fixed by the city. Mayor Caldwell has returned to the Council without his signature the bill passed recently by which jitneys would be barred from the downtown district. Mayor Caldwell said:

> This Council bill impresses me as an indirect effort to abolish the jitneys, and until the city of Seattle can offer some form of transportation that will take the place of the jitneys as a means of rapid transportation I am opposed to excluding them from the streets, provided they can be subjected to reasonable regulation.

Mayor Caldwell expresses the opinion that if the Council bill prohibiting the use of any downtown streets by the jitneys is submitted to the voters it will be defeated. Failure of the Mayor to approve the election ordinance would mean that the Council would have to change the measure to a thirty-day bill, and pass it over his veto to put it into effect. It would be impossible to take this action in time to call a special election for November 2. The Mayor has since asked the Council to prepare an alternative measure, similar to the ordinance now in effect, to submit with the initiative bill proposed by jitney interests.

Underground Challenges London County Council

A cable dispatch from London, England, dated Sept. 25, indicated that omnibuses in London would start a counter offensive against the tram cars on Sept. 26 by cutting fares during the non-rush hours to practically a flat 5-cent basis. The London Electric Railway, which owns all the subways and omnibuses in London, believes it will be able to show that the municipally-owned tram cars are operated at a loss, which the taxpayers have to make up, and that these tram cars constitute a costly and unfair competition to private enterprises. For six months the tram cars have been selling "tuppeny" (4 cents) tickets, which are good on any line between 10 o'clock in the morning and 4 o'clock in the afternoon. The management of the London Electric Railway believes it will be able to show that the tram cars cannot earn more money on the basis on which they are operated now and will challenge the London County Council, owning the tramways, to publish a statement of earnings and operating cost, hoping thus to be able ultimately to replace the tramcars and substitute omnibuses on many routes after showing the taxpayers what the tramways actually cost them.

Seven Cents in Trinidad

The Colorado Public Utilities Commission has authorized the Trinidad Electric Transmission, Railway & Gas Company, Trinidad, to raise its fare from 6 cents to 7 cents. The company some time ago applied to the commission for authority to discontinue service on its line in Pine Street and to remove the tracks. This petition is denied by the commission, which has allowed the rate increase as an alternative. The 6-cent fare took effect about a year ago.

Ten-Cent Fare Imperative

Connecticut Company Appeals to State Commission for Further Rate Increase—Seven-Cent Rate Proves Insufficient

Declaring that the Connecticut Company, New Haven, Conn., must have more revenue if it is to continue operation, Lucius S. Storrs, president, and other officials of the company appeared before the State Public Utilities Commission at a hearing on Oct. 1 to ask authority to charge a 10-cent fare. The railway management had previously intimated that a 10-cent fare was necessary. Although the 7-cent rate now in effect has yielded the company larger returns than the former zone fare system, the increase has not been sufficient to meet the operating expenses. The company officials declared that the 10-cent rate is imperative. The company is already charging a 10-cent fare on its lines in New London, formerly operated by the Shore Line Electric Railway.

THE opening arguments for the company were presented by President Storrs. He was followed in turn by George D. Watrous of New Haven, general counsel for the company, and Joseph D. Berry of Hartford, associate counsel.

P. J. MacCreevy of New Haven, statistician, spent most of the forenoon presenting figures tending to show the company's receipts and expenditures. The cities and towns of Hartford, East Hartford, New Haven, West Haven, Vernon, Rockville and Hamden were represented at the hearing

GAIN IN RECEIPTS

The increases in fare last fall and in August of this year showed the following percentages of increase in receipts over the year preceding, as shown by Mr. MacCreevy's figures: November, 1919, 18; December, 21.96; January, 1920, 23.29; February, 25.9; March, 18.98; April, 17.20; May, 15.71; June, 2.62 loss; July, 0.96 loss; August, 6.62 increase. The receipts in Bridgeport for 1919 were not included in the lists, the discontinuance of the service there making it inadvisable in order to secure actual figures of gain or loss for the rest of the system.

Total receipts for 1920 to date are $12,715,017, while for the same period in 1919 they were $12,638,979, or an increase of $76,037 or 2.88 per cent. Redemptions of $34,344 for zone cards sold were made, which left the net increase $41,692 or 1.58 per cent. The estimated expenses of the company to Dec. 31, 1920, are $15,657,222, not including dividends or surplus. The operating expenses to Dec. 31 are given as $12,833,995. In 1916 these figures read $6,554,304. This gives an increase in the past four years of 95.81 per cent. The operating expenses for 1919 were stated to have been $9,210,376.

WAGES UP 97.4 PER CENT

It was shown that in 1916 wages amounted to $3,925,854 as against $5,959,332 for 1919, or an increase of 51.8 per cent. In 1920 with four months estimated the wages will be $7,750,000 or an increase of 97.4 per cent. Fuel cost $571,589 in 1916 and $850,979 in 1919, an increase of 48.9 per cent. In 1920 the fuel expense will be $1,400,000, an increase of 145 per cent. The cost of materials in 1916 was $374,560. In 1919 this expense was $515,111, an advance of 37.5 per cent. This year the cost of materials will be $800,000.

It was stated that one-half of the operating expenses are charged to wages and 30 per cent to fuel. The maximum cost of materials over pre-war prices was given as 595 per cent and the lowest increase as 27 per cent. In 1914 coal was delivered for $3.15 a ton. Now it costs $16 and the company has paid as high as $20.

No figures were given showing the increases individually for the various branches of employment over the figures for 1916. No data were presented to show to what an extent the jitneys had cut into the company's business throughout the State. Mr. MacCreevy said that in August, 1920, under the 7-cent rate it would have required 40 per cent more revenue to care for the fixed charges and allow a fair return, and as the conditions were unchanged for September, this percentage applies for that month.

WOULD RETAIN TRANSFERS

Walter C. Noyes, chairman of the board of directors of the Connecticut Company, expressed the belief that the elimination of the transfer privilege would not help the company much, though it might possibly add a few hundred dollars in revenue. He admitted that it might be possible to raise the fares to such a figure as to induce patrons to ride on the steam cars but he estimated that 70 per cent of the traffic would stand the fare increase to 10 cents and that such a rate would produce the needed revenue.

Judge Noyes thought that the proposed 10-cent fare would pull the company out of the financial hole it is now in though it would be far in the future before the railway could pay off its debts. He said the problems of the company could be solved with the 10-cent rate or not at all.

It was pointed out to the commission that the debts of the company, in addition to the operating expenses, included $1,500,000 owed to the State of Connecticut and between $4,000,000 and $5,000,000 due to the New York, New Haven & Hartford Railroad, which it would take some time to pay off. Judge Noyes thought it far better to have the State take over the company's lines as a unit rather than to have the system split up.

Personal Mention

H. R. Fehr Retires

Veteran Traction Operator Resigns as President of the Lehigh Valley Transit Company

Harrison R. Fehr has resigned as president and a director of the Lehigh Valley Transit Company, Allentown, Pa., as vice-president of the Pennsylvania Power & Light Company and as an official and a director of all subsidiary and affiliated properties. At the urgent request of the boards of directors of the various companies with which he has been connected, Mr. Fehr has consented to remain with them in an advisory capacity, so that the interests which he has served for many years will be in a position to consult him and will have the advantage of his judgment. At the same time Mr. Fehr will be relieved of the active management.

H. R. FEHR

The news of Mr. Fehr's resignation was received with regret not only in business and professional circles in Allentown, but also among the general public of the Lehigh Valley, where he has been a dominant figure in engineering and transportation affairs for more than a quarter of a century. There had been rumors of his desire to retire ever since his recovery from a recent illness. When Mr. Fehr first broached the matter of resigning the board of directors of the Lehigh Valley Transit Company appointed a committee to induce Mr. Fehr to reconsider his action, but he remained firm in his determination.

Mr. Fehr's career has been one of growth matching that of the community in which he had resided, and with whose development he has been actively identified. He was born in Nazareth, Pa., in 1863. At an early age he took up engineering and in the spring of 1883 he accepted a position with the engineering corps of the Lehigh Valley Railroad and later became assistant engineer. In the fall of 1891 he was elected city engineer of Easton, Pa., and occupied that position for eight years. He next engaged in engineering construction work on electric railways and in general contracting. In May, 1904, he was appointed general manager of the Easton Transit Company. In the following year he was elected president of the company. Seven years ago he was called to Allentown to become president of the Lehigh Valley Transit System, of which the Easton Transit Company is now a part.

Mr. Fehr's administration of the property has been characterized by vision and progress. Under his management the system has been largely rebuilt, including the construction of the Philadelphia line cutoffs, the erection of the Fairview carhouse, the extension of the Front Street power station and the completion of the Eighth Street bridge. He has for many years taken an active interest in the work of the American Electric Railway Association and of the Pennsylvania Street Railway Association. During 1911 he served as president of the latter body.

M. V. Dommech has been elected president and general manager of the Porto Rico Railway, Light & Power Company, San Juan, Porto Rico. Mr. Dommech succeeds E. M. Sewell, resigned.

H. R. Domby has resigned as purchasing agent of the Birmingham Railway, Light & Power Company, Birmingham, Ala. Mr. Domby has been in the employ of the company since September, 1906, all of his work being in connection with the purchasing and stores department, which he entered as a clerk.

Benjamin F. Thomas, who has been connected with the United Railways of St. Louis, Mo, for the past three years as mechanical engineer, has resigned, effective Oct. 1. Mr. Thomas has been appointed assistant superintendent of power of the Scullin Steel Company, St. Louis, Mo. He is a graduate of the Massachusetts Institute of Technology, Boston.

Charles S. Ruffner, vice-president of the American Institute of Electrical Engineers and vice-president of the North American Company, New York, N. Y., has been appointed chairman of the traction and transportation committee of the American Institute of Electrical Engineers, succeeding W. S. Murray, who is at present devoting his attention to his work for the Super Power Survey.

Bigger Louisville Staff

President Barnes Brings F. E. Belleville and E. F. Kelley from Schenectady —Operating Personnel Complete

Two additions have recently been made to the staff of James P. Barnes, president of the Louisville (Ky.) Railway. The new members of Mr. Barnes' official family are F. E. Belleville, who becomes general auditor of the company, and Edward F. Kelley, who has been appointed secretary to Mr. Barnes. Both Mr. Belleville and Mr. Kelley served under Mr. Barnes when the latter was general manager of the Schenectady (N. Y.) Railway.

Since assuming the duties of president of the Louisville system last July, Mr. Barnes has spared neither time nor energy in building up an organization composed of picked men upon whom he can fully depend. With the appointment of Mr. Belleville and Mr. Kelley, the new administrative force has been completed. The executive committee made up of three of the company's directors which has been in charge of the railway's affairs since the resignation of Thomas A. Minary early this year, has therefore been relieved of the task of administration. The committee, composed of John W. Barr, Jr., W. H. Kaye, and W. S. Speed, will continue to serve in an advisory capacity for an indefinite period.

F. E. BELLEVILLE

Under the reorganization plan the operating staff is made up as follows: Mr. Barnes, president; Samuel Riddle, vice-president in charge of transportation and traffic; Frances H. Miller, vice-president with supervision over engineering and construction matters; Samuel G. Boyle, secretary-treasurer; F. E. Belleville, general auditor; Judge A. P. Humphrey, general counsel, Churchill Humphrey, assistant general counsel. With but three exceptions, the present executive force was with the company before the resignation of Mr. Minary.

Mr. Belleville's electric railway career began nineteen years ago when, at the age of seventeen years, he entered the service of the Rutland Railway, Light

& Power Company, Rutland, Vt., as a stenographer and clerk. In 1907 he was made chief clerk in the accounting department of the United Traction Company, Albany, N. Y. Two years later he went to Schenectady, where he served in various capacities with the Schenectady Railway, finally being appointed general auditor.

Mr. Kelley became connected with the New York State Railways in 1909 when he entered the mechanical and engineering department of the company's Utica and Syracuse lines. In 1914, when the Buffalo, Lockport & Rochester Railway, Rochester, passed into the control of Allen & Peck, Inc., Mr. Barnes, then general manager of the property, made Mr. Kelley chef clerk. Later Mr. Kelley was appointed purchasing agent of the company in addition. He resigned this position to accompany Mr. Barnes to Schenectady when the latter was made general manager of the system there.

R. W. George, a division superintendent of the Georgia Railway & Power Company, Atlanta, Ga., has resigned.

F. R. Murrie has been elected president of the Hershey (Pa.) Transit Company. Mr. Murrie succeeds M. F. Hershey.

F. Pefferkorn has succeeded E. C. Brister as general manager of the Alexandria (La.) Municipal Street Railway.

W. R. Bell has resigned as commercial agent of the Baton Rouge (La.) Electric Company, to accept a similar position with the Haverhill Gas Light Company, Haverill, Mass.

W. D. Chalmers, formerly connected with the Columbus (Ga.) Electric Company, has succeded E. P. Williams as assistant treasurer of the Baton Rouge (La.) Electric Company.

J. M. Strike, superintendent of production of the Toledo Railways & Light Company, Toledo, Ohio, has been transferred by the Cities Service Company to be results engineer for the Western District with headquarters at St. Joseph, Mo. Mr. Strike joined the Doherty organization in 1917. After working with the Acme Power Company as superintendent and the Toledo Railways & Light Company as results engineer, and assistant superintendent of production, he was placed in charge of the production department as superintendent.

George Carson, claim agent Fifth Avenue Coach Company, New York, N. Y., has resigned. Mr. Carson has removed to Seattle, Wash., his former home to organize and to become manager of the Pacific Investigation, Adjustment & Lawyers' Service Bureau. The purpose of this bureau is to conduct a business in the adjustment of all classes of claims, prepare cases for trial, carry on investigations, etc. Mr. Carson was formerly claim agent of the Puget Sound Traction, Light & Power Company and has been president of the Pacific Claim Agents Association and of the American Electric Railway Claims Association.

Ernest Stenger, New Denver President

Steam Railroad Executive Is Chosen Head of Denver Tramway—Vice-President F. W. Hild to Retire on Jan. 1

Ernest Stenger, superintendent of the Southern Division of the Union Pacific Railroad, was elected president of the Denver (Col.) Tramway by the board of directors on Sept. 29. At the same time F. W. Hild, general manager, was elected vice-president. Immediately thereafter Mr. Hild submitted his resignation. Mr. Hild will probably remain with the company until Jan. 1, when he will retire to devote his attention to other activities. The board also announced the postponement of payment of interest on $2,500,000 of outstanding notes. Mr. Stenger arrived in Denver on Oct. 6 to take up his new duties.

SIMULTANEOUSLY with the announcement of Mr. Stenger's election, officials of the carmen's union declared that they would reopen negotiations with the company. They stated that they were optimistic that the new management would recognize the union and would take back the strikers. Mr. Stenger stated, however, that hopes of the reinstatement of the men with full seniority rights were absolutely without foundation. The directors stated that their position remains unchanged and that "there is not a chance in the world" for the recognition of the union and the reinstatement of the strikers.

F. W. HILD

Mr. Stenger is a newcomer in the electric railway field, his previous experience having been entirely in steam railroading. Shortly after his arrival he stated that he had come to Denver to operate the tramway in such a way as to best serve the public. He outlined his position as follows:

> I have no antagonisms or prejudices and am actuated by a desire to get on well with everybody. Throughout the country the Denver Tramway is regarded as one of the best street railway systems in the United States. There will be no changes in policies or officers that I know of.

Mr. Hild stated that he would remain with the company until the reorganization of the operating force had been completed. He has had many offers in the past two years from other lines of business presenting much greater opportunities, but has stuck by the tramway because of its many difficulties. A high tribute was paid to Mr. Hild in the following statement:

> At the meeting of the board of directors of the Denver Tramway held on Sept. 29, Ernest Stenger, of Kansas City, Mo., was elected president of the company and Mr. F. W. Hild, present general manager, was elected to the vice-presidency. The position of president has been vacant for a great many years, and while the board regrets that the Tramway will within a few months lose the services of Vice-President Hild, it believes that in Mr. Stenger the company has a man who will carry on successfully the Tramway policies so efficiently handled by Mr. Hild.
>
> As only a small measure of tribute and appreciation, the board takes this opportunity of stating publicly that for some time past General Manager Hild has asked that he be relieved in order that he might be free to devote himself to fields and other activities that would permit the reward and compensation not possible with the Tramway. The board appreciates fully his fine sense of loyalty and self-sacrifice in sticking to his post during the Tramway's worst and darkest periods, and in the face of attractive offers elsewhere. The Tramway now being over the worst crisis, Mr. Hild has consented to remain until such time as may be necessary to reorganize the operating forces and to help the new President, Mr. Stenger, to take over the work. The board of directors unanimously and in all respects indorses and approves the policies and management of Mr. Hild, and they will be continued by President Stenger.
>
> The difficult and trying conditionsu under which the Tramway has been compelled to operate during the past several years, arising from very great increases in labor and material costs, culminating in the strike of August, has at this time used up all of the company's available funds. The board of directors has therefore decided to postpone payment of interest due Oct. 1 on its outstanding convertible notes, with the hope and expectation that a solution of the Tramway's problems can be worked out within the next few months.
>
> Mr. Stenger is the general superintendent of the Union Pacific Railroad in Kansas City. He comes here highly recommended as an able executive.

The statement just quoted was made over the signature of C. Boettcher, chairman of the board of directors.

Mr. Hild became vice-president and general manager of the tramway four years ago. Prior to that time he had served as general manager of the Portland Railway, Light & Power Company, Portland, Ore. He was graduated as an electrical engineer from Union College, Schenectady, N. Y., in 1898, and was for a time connected with the General Electric Company. He was one of the originators of the idea of forming an association to represent the electric railway industry on the Pacific Coast, and was chosen president of the Pacific Coast Electric Railway Association upon its organization in San Francisco in April, 1913.

Will Raise Suburban Rates

The Syracuse & Northern Electric Railway, Syracuse, N. Y., under a tariff filed recently with the Public Service Commission, Second District, effective on Sept. 30, will increase present one-way cash and ticket fares approximately 25 per cent, with a minimum fare, except in Syracuse, of 10 cents. It is also proposed to increase commutation ticket and mileage book fares 25 per cent.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT
ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Shortage of Guy Wire Relieved

Scarcity of Wire Rods Has Impeded Production—Deliveries Now Made in Thirty Days

The shortage in guy wire seems to have been due in large measure to the number of different types of mills required to make the finished product. Because of better labor supply and improved transportation facilities, however, the shortage is gradually being overcome.

The stranding mills have been held up waiting for supplies from the wire mills, and it seems that the wire mills, on the other hand, have been unable to get a sufficient supply of wire rods to permit them to draw sufficient wire to supply the demand for both wire and strands. Trouble started in the steel mills last fall when the stocks of the stranding and wire mills became depleted, and the demand has been so heavy since that time that they have been unable to build up any reserve stock of raw materials to tide over temporary labor and transportation difficulties.

On the higher grade steel strands, such as high-strength and extra-high-strength strands, the shortage is more accute because it has been practically impossible to secure from the wire-rod mills the high-grade steel from which these strands are made. Deliveries from the mills have been running from sixty to ninety days, but now they are promising thirty-day shipments and even better than this on some kinds and sizes of strand.

Supply of Wood Handles Improving

Demand Is Heavy and Stocks Not Large, but Raw Material Is Received in Better Shape

Manufacturers of wooden handles for track and boiler room tools report that the condition of shortage is easing up slightly now that transportation is improving and they are able to obtain raw material more readily. No letup in the demand is seen, in fact, in some quarters the pressure of orders is said to have increased within the last month, as the heavier buying of steam railroads on account of their new rate increases makes itself felt. Not only is a good domestic market available but foreign countries have been buying consistently, it is stated. Good sales are made to South Africa, Australia, England, Cuba, and other countries.

A considerable volume of back orders has accumulated with manufacturers. Production is said to be proceeding normally on the whole, but consumption is going ahead at a faster rate than goods can be turned out. Many producers have had considerable difficulty in securing first grade and extra quality hickory to go into the making of sledge, pick, scoop and shovel handles, etc. Consequently in many cases an inferior grade of wood has been used, but because of the high prices prevailing for the finest quality matetrial, many buyers have been satisfied to accept second grade wood. Deliveries of the finished products are now encompassed within a period of one to three months, according to representative manufacturers. The extra quality handles require the longest time, in one or two cases ranging up to even six or eight months. Stocks are spotty, as some factories have fairly good supplies while others report none on hand.

One of the factors which has been hampering handle makers is the handicap that has all along been imposed by the unfavorable winter last season. Rain and the lack of frozen ground interfered with getting out the timber to a serious extent. Furthermore, during the Federal control railroads allowed their stocks of wood handles to become depleted and factories never fully caught up with the volume of orders that eventually piled up. Prices on handles used in track tools have not advanced for the last three or four months. Opinions differ as to whether a change is to be expected.

Manufacturers See Small Hope of Immediate Price Reductions

Labor and Raw Material Costs Are at High Level, Although Copper and Cotton Show Slight Decline—Outlook for Future Business Is Held to Be Favorable

Considerable speculation is manifest as to the effect that price cuts in many lines may have upon prices of material used by electric traction companies. As yet it seems there has been no decided reaction in this line. In the East the view is expressed in authoritative quarters that conservatism in buying will rule for the next few months until business conditions become more settled. Further than that, while many manufacturers will not venture predictions, a very large number seem to feel optimistic over the outlook for 1921. The basis for this is held to be the undersold condition of the railway market. Traction companies in the past have curtailed equipment buying to a minimum commensurate with their financial condition. As the buying power of money increases, however, orders are expected to multiply, according to one of the largest manufacturers of electric railway equipment.

The general feeling seems to be that no decided price decline can be looked for in the immediate future. Labor is one of the largest factors in the cost of production. Labor prices remain high and existing contracts in many cases have considerable time to run yet. Furthermore, it is pointed out that a great part of the manufacture of goods in this line is dependent upon finished products in other lines. For this reason, though the same basic condition of supply and demand is existent, producers hold that raw material costs must first drop before their prices can come down. As yet about the only materials reported easier in price are copper and cotton, so that products of which these materials form an important part may be expected to soften in price first, it is stated. A similar factor largely governs chances of lower prices on other material. The trend of iron and steel quotations should have an important bearing upon prices of goods employing that material in large quantity, according to manufacturers. Others oppose this view on the ground that if the market is largely undersupplied with any article, that circumstance will defeat a trend toward lower prices regardless of raw material costs.

General Tone Is Favorable

The point upon which all interests apparently agree is a persistent optimism regarding the future of the industry. In this connection, an analysis of statements recently received by the Electric Railway Journal from about sixty of the largest manufacturers of equipment representing thirty different lines of material is interesting. Barring the non-committal replies in each case, only two manufacturers reported an appreciable number of cancellations while four others received a few. The number of companies that are hampered by a scarcity of raw material were slightly in the majority. Stocks of finished goods are also unfavorable, those whose stocks are low outnumbering those whose supplies are good by more than two to one. On the other hand, transportation is very generally improving. Manufacturers who reported a decidedly better labor situation were in the majority by more than five to one. Production in two out of three instances was reported up to normal capacity. Another encouraging feature is that thirty-eight companies are meeting a strong even demand, three find it fair and only nine report a poor or slackening volume of sales. With regard to the trend of prices, sixteen manufacturers believe slightly higher levels are in order, twenty-five think present quotations will hold firm, and three look for lower prices.

The latter views covered bare and insulated wire and trolley wheels, though other opinions on the same material differed. In forty-three of the replies the tone is optimistic, five are pessimistic and the remainder are noncommittal.

2,400 Power Saving Recorders Ordered for Brooklyn

The Arthur Power-Saving Recorder Company announces that it has just received an order through its Eastern agent, J. H. Denton, for 2,400 recorders for surface cars of the Brooklyn Rapid Transit System. This is the largest order of power-saving instruments ever placed at one time and the choice was made after very thorough tests had shown the value and desirability of these instruments.

London Asks for Bids on Cars and Equipment

The London County Council invites tenders for the manufacture, supply, delivery and maintenance of:

"A" 125 complete bodies for electric tramcars.

"B" 125 complete sets of maximum traction bogie trucks for electric tramcars.

"C" 125 complete sets of electrical equipments for tramcars, together with the assembly of 125 car bodies, sets of trucks, electrical equipments and brakes into complete tramcars, and the preparation thereof in readiness for service operation.

Specifications, forms of tender, and other particulars may be obtained on application to the Clerk of the Council, at the County Hall, Spring Gardens, S.W.1, upon payment to the cashier of the Council of a fee of £2 each for either "A," "B," or "C," or £5 for the three sets complete, according to the *Electric Railway and Tramway Journal* of London.

All the drawings and samples which are referred to in the specifications can be inspected by appointment with the general manager, London County Council, Tramways Department, 23 Belvedere Road, S.E.1, on production of either a copy of the specification concerned, or a signed receipt for the fee paid in respect thereof. Each tender submitted must be upon the respective official form and with its accompanying documents is to be enclosed in a sealed cover and addressed to the Clerk of the Council. No tender received at the County Hall, Spring Gardens, London, S.W., after 4 p.m. on Monday the 25th day of October, 1920, will be considered.

Rolling Stock

Birmingham (Ala.) Railway, Light & Power Company, it is announced, expects the arrival of fifteen new one-man cars about the middle of October.

The Chicago (Ill.) Surface Lines now has under construction in its west side shops fifty two-way trailers similar to the sample car described in the July 17 issue of ELECTRIC RAILWAY JOURNAL. The company is also preparing plans and specifications for new motor cars.

Dallas (Tex.) Railway Company has received eight of the fifty new safety cars ordered some time ago from the J. G. Brill Company, Philadelphia, Pa. Each car is propelled by two 25-hp. interpole motors of the very latest design and is equipped with H.B. lifeguards. The complete weight of each car is a little over eight tons. It is the plan of officials of the company to operate twenty-five of the new cars on one line, and with the remainder to operate two crosstown lines.

Northern Ohio Traction & Light Company, Akron, Ohio, mentioned in the Aug. 14 issue of the ELECTRIC RAILWAY JOURNAL as having just received authority from the Public Utilities Commission to purchase fifty-six city cars, among other equipment, has specified the following details on thirty-one of these cars:

Number of cars ordered	31
Date of order	Feb. 11, 1920
Delivery	August
Builder	G. C. Kuhlman Car Company
Type	"Peter Witt" Steel
Seating capacity	54
Weight, total	42,880 lb.
Bolster centers, length	25 ft. 6 in.
Length over all	50 ft. 1¼ in.
Truck wheelbase	0 ft. 58½ in.
Width over all	8 ft. 4 in.
Height	11 ft. 1⅝ in.
Body	Steel
Interior trim	Cherry
Headlining	Agasote-Buff
Roof	Arch
Air brakes	G. E.
Axles	Penna. R.R., Ltd.
Bumpers	Hedley Anti-Climber
Signal System	Faraday
Control	Westinghouse HLM Modified
Couplers	Ohio Brass
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote
Designation signs	Hunter
Door operating mechanism	National Pneumatic Company
Fare boxes	Cleveland Fare Box Company
Fenders or wheelguards	N. O. T. & L. Co., Ltd.
Hand brakes	American Brake Company
Heaters	Peter Smith Heater Company
Headlights	Crouse-Hinds Company, Type W
Lightning arresters	Westinghouse
Motors	Westinghouse 532-A
Sanders	Nichols Lintern Company
Seats	Brill
Seating material	Rattan
Trolley catchers or retrievers	Trolley Supply Company
Trolley wheels	More-Jones Brass & Metal Company
Trucks	Brill 68-E
Ventilators	Nichols-Lintern Company
Wheels	Forged Steel Wheel Company, 26 in.

The remaining twenty-five city cars were ordered from the same company on Feb. 16, 1920, and specified the same equipment as above except that in this case the control is Westinghouse K-35-G-2, and the trucks Brill 51-E.

Track and Roadway

San Diego (Cal.) Electric Railway.—The San Diego Electric Railway is planning to use heavier rail and to reconstruct its lines on Sixteenth Street, Logan Avenue and National Avenue.

Carolina Power & Light Company, Raleigh, N. C.—The Carolina Power & Light Company is preparing to extend the double-tracking of its line on Hillsboro Street, Raleigh, from the place where the single-tracking begins near Park Avenue to the College Court Pharmacy in West Raleigh. This improvement will cost approximately $10,000.

Hamilton (Ont.) Street Railway.—The City Council has approved the report of the street railway committee providing for an extension on King Street West, from Margaret Street to Paradise Road. The proposal of the company to construct this line was referred to in the ELECTRIC RAILWAY JOURNAL of Aug. 7.

Ottawa (Ont.) Electric Railway.—The acquisition of the Ottawa Electric Railway was discussed at a private meeting of the board of control of the city. The matter is due for discussion at the next meeting of the City Council.

Sarnia (Ont.) Street Railway.—Citizens of Sarnia are anxious to obtain a better railway service along the river front, and local men are endeavoring to get support for a radial proposition here. A suggestion that the line be extended to Corunna has received much support.

Montreal, Que.—F. W. Cowie, chief engineer of the port of Montreal, has stated that the electrification of the Montreal harbor railway terminals is now well in hand and about 42 miles of track will be in operation next spring. The remaining 16 miles will be electrified later.

Rhode Island Company, Providence, R. I.—It is possible that the Rhode Island Company within the next few months may discontinue the line from Crescent Park to Bristol. This line has been operated at a loss for some time according to the general manager.

Cincinnati, Ohio.—An additional strip of the canal, approximately 1½ miles long, is sought by the Rapid Transit Commission for the subway system now in process of construction. A resolution will be introduced in Council providing for the leasing of the section from the state. The strip sought extends from a point 300 ft. west of Mitchel Avenue to a point 1,000 ft. beyond the crossing of the canal at the intersection of the B. &

O. Railroad in St. Bernard. Governor Cox will be requested to appoint a commission to place a value upon the strip as a basis for the lease.

Interurban Railway & Terminal Company, Cincinnati, Ohio.—City Solicitor Saul Zielonka has requested an opinion from Street Railway Director William C. Culkins as to the legal right of the Interurban Railway & Terminal Company to remove a track extending to California, Ohio, along Kellog Avenue, a distance of approximately 300 ft. The company asserts the track is no longer required for the operation of its cars since only a single track is used. In a letter to the City Solicitor, Attorney Eli G. Frankenstein states the action of the company is prompted by a desire to prevent the extension of the East End line to California, an initiative ordinance which is to be submitted to the voters at the November election.

Dallas (Tex.) Railway.—The City of Dallas has asked the Dallas Railway to rebuild its tracks on South Lamar Street, in connection with the opening up, widening and paving of this street so as to provide a cross-town thoroughfare for that part of the city. Rebuilding of the tracks on this street will be one of the largest improvement projects of the railway now in prospect.

Houston, Bay Shore & Texas City Traction Company, Houston, Tex.—The Houston, Bay Shore & Texas City Traction Company, a recent incorporation, is making headway toward the construction of its interurban line.

Fort William (Ont.) Electric Railway.—A by-law authorizing raising of $12,150 for the extension of the Fort William Electric Railway to the site of the new pulp mill, which is under erection in Fort William, will be submitted to ratepayers on Oct. 13.

Canadian National Railways, Montreal, Que.—The Hydro-Electric radial policy of taking over branch lines of the Canadian National Railways, electrifying them and using them as feeders for the national lines, has been approved by the City Council.

Seattle (Wash.) Municipal Railway.—Work of laying tracks on Washington Street from Second Avenue west to the approach of the elevated railroad at First Avenue and Washington Street has been ordered by the Municipal Street Railway Department. When these tracks are in, it will permit of Second Avenue cars reaching the elevated direct without detouring.

Walla Walla Valley Railway, Walla Walla, Wash.—The Walla Walla Valley Railway is considering the extension of its interurban line from the State line to Umapine. The proposed extension is six miles in length and if built will tap a big alfalfa and fruit belt which now has no railroad facilities. It is said that the company is now tearing up rails in Walla Walla on several abandoned lines and will have steel sufficient for the proposed new work. It is expected definite action will be taken shortly by company officials.

Power Houses, Shops and Buildings

Eastern Massachusetts Street Railway, Boston, Mass.—The Eastern Massachusetts Street Railway plans to convert the carhouse at Washington Avenue, Chelsea, into a repair shop.

Connecticut Company, New Haven, Conn.—A permit has been granted by the city of Rockville to the Connecticut Company to build a waiting station at Spring Street, Rockville. This convenience was requested about a year ago, but the construction work was held up because it encroached on railroad property and extended into the street several feet.

Trade Notes

The Chicago (Ill.) Surface Lines has purchased ten Johnson registering fare boxes for installation on the ten safety cars, purchase of which was recently announced in Electric Railway Journal.

The General Electric Company, Schenectady, N. Y., has acquired the five-story, 60 ft. x 242-ft. factory of the Randal-Faichney Company at 76 Atherton Street, Roxbury, Boston, together with a large power plant.

A. C. Streamer, manager of the switchboard section of the supply department, Westinghouse Electric & Manufacturing Company, has been appointed industrial assistant to the manager of the supply department of that company, with headquarters at East Pittsburgh, Pa.

The M. H. Detrick Company has opened an Eastern branch at 30 Church Street, New York. The company makes suspended arches and steam-set ash conveyors. The office will be under the direction of R. D. Foltz, Eastern sales manager. H. S. Sleicher will handle sales in New York as before.

Charles Piez, president of the Link-Belt Company, 910 S. Michigan Avenue, Chicago, Ill., and former director-general of the Emergency Fleet Corporation, has written a report on the steel strike. Copies of the article can be secured by applying to the executive offices of the company.

Ackley Brake & Supply Corporation, 50 Church Street, New York, N. Y., has appointed A. W. Arlin, who is located at 772 Pacific Electric Building, Los Angeles, Cal., as its Pacific Coast representative. Mr. Arlin's experience in the railway field dates back twenty years to his connection with the General Electric Company, with which he has been connected at the Salt Lake City and Denver offices.

R. A. Bull of Pittsburgh has been appointed consulting metallurgist for a number of prominent steel foundries grouped for the purpose of developing and perfecting higher standards in the production of steel castings, it is announced. Mr. Bull will devote his entire time to preliminary research work and has resigned his position as vice-president of the Duquesne Steel Foundry Company. The members of the group include Electric Steel Company, Chicago; Fort Pitt Steel Castings Company, McKeesport, Pa.; Isaac G. Johnson Company, Spuyten Duyvil, N. Y.; Lebanon Steel Foundry Company, Lebanon, Pa.; Michigan Steel Castings Company, Detroit, Mich., and Sivyer Steel Castings Company, Milwaukee, Wis. Mr. Bull is a member of numerous technical associations and since 1911 has been a director of the American Foundrymen's Association. During 1916 and 1917 he served two terms as its president. His connection with the foundry industry covers a period of more than twenty years.

Whiting Foundry Equipment Company, Harvey, Ill., specializing in electric traveling cranes and complete foundry plants, announces its consolidation with the American Foundry Equipment Company of New York City. The new organization will be known as the Whiting Corporation and will be capitalized at $5,000.000. J. H. Whiting, president of the Whiting Foundry Equipment Company, becomes chairman of the board, and V. E. Minich, president of the American Foundry Equipment Company (Sand-Mixing Machine Company) and of the Foundry Equipment Manufacturers' Association, will be president. As the lines of manufacture do not overlap it is the intention to maintain all present manufacturing facilities. The plans include maintaining and enlarging the present offices of the American Foundry Equipment Company, 366 Madison Avenue, New York, N. Y., as the eastern sales and export office of the combined companies. Important economies in manufacture and distribution are expected to result.

New Advertising Literature

Carbon Electrodes.—National Carbon Company, Inc., New York, N. Y., is distributing an eighteen-page booklet on "The Carbon Electrode." Copies may be obtained upon request.

Wire.—Habirshaw Electric Cable Company, Yonkers, N. Y., has issued a new 172-page, flexible-cover illustrated handbook, entitled "Habirshaw Manual of Wires and Cables."

Trolley Equipment.—"Nuttall Products for Electric Railway Service" is the title of illustrated bulletin No. 28, issued by R. D. Nuttall Company, Pittsburgh, Pa., describing its gears, trolley bases, poles, wheels, harps and sleet wheels and scrapers.

Electric Hoists.—Link-Belt Company, 910 South Michigan Avenue, Chicago, Ill., is distributing the ninety-six page revised edition of catalog No. 38, covering the Link-Belt line of standardized monorail electric hoists and overhead electric traveling cranes in capacities of one-half to three tons.

General Manager: Do you rely on Air alone for stopping those new safeties on the Main Street Hill?

One accident there will cost more in claims and damaged equipment than a set of Peacock brakes for every car on the line.

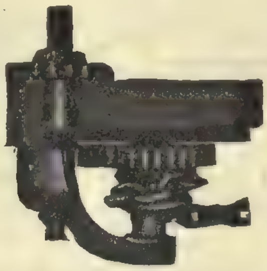
Superintendent of Transportation: Of course, it's hard to prevent them all from piling on the seven or eight safeties that are due to leave the mill at 5 P. M.

G. M.: But then, seventy-five passengers for a fairly short haul means more revenue provided we can get up the hill safely.

Supt. of Trans.: So far, this air has worked O.K., but you know the air brake does not take into account the extra load and if it should ever fail on that hill, good night.

G. M.: Yet, the passengers weigh almost as much as the safety car itself.

Supt. of Trans.: Well, the best thing we can do is to order Peacock Type G Brakes for all of our safeties before it is too late. They will give all the extra braking power needed for our safeties on Main Street hill. And they cost so little we can hardly afford to be without them.



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An Invitation

A cordial invitation is extended to you to visit our exhibit at the 39th annual convention of the American Electric Railway Association at Atlantic City, N. J., October 11th to 15th, 1920. Our space numbers are 562, 563, 564 and 565.

One of the most interesting features of our exhibit will be a display showing the various steps in the production of circular sections such as gear blanks, wheels, etc., by our combined rolling and hydraulic forging process. The samples shown give a far better idea of the thorough working the steel receives than any description can do.

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Rings
Roll Shells Steel Springs

"The 'Standard' Brand on your material is an assurance of eventual economy."

STANDARD STEEL WORKS CO.

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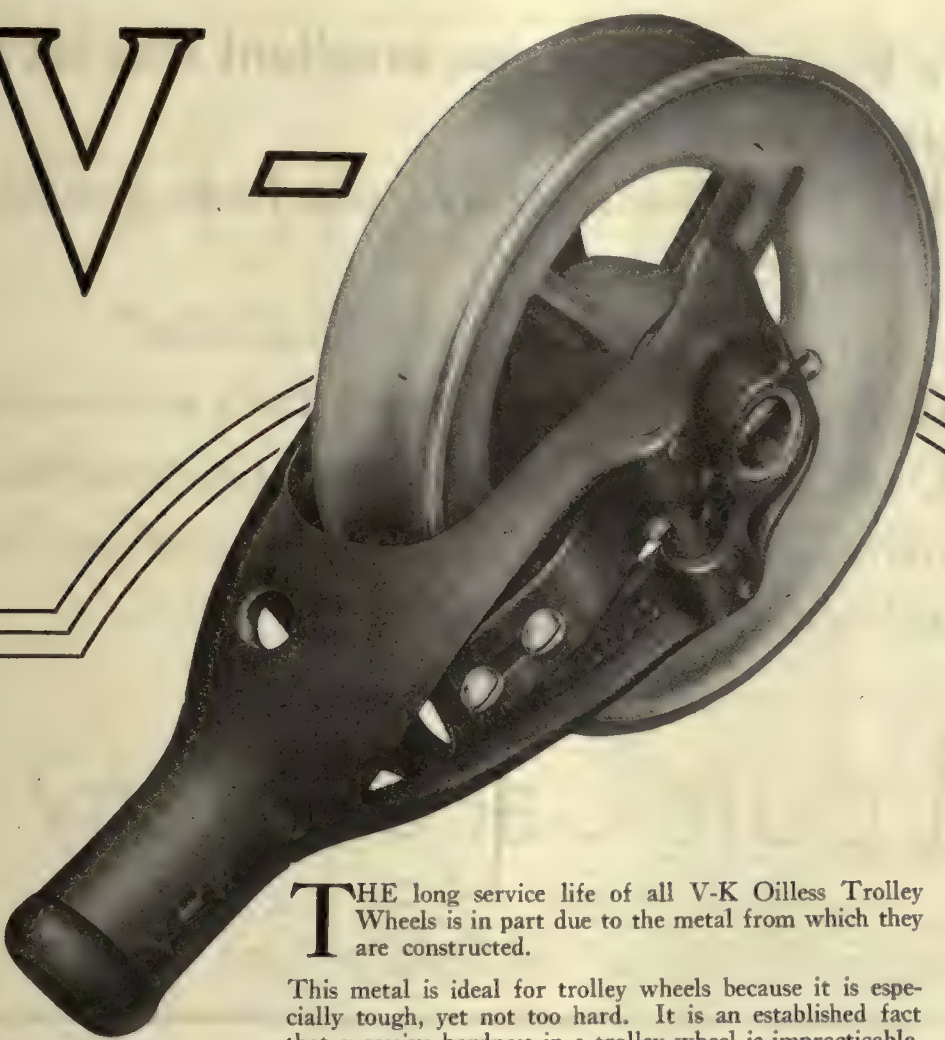
V-K



THE long service life of all V-K Oilless Trolley Wheels is in part due to the metal from which they are constructed.

This metal is ideal for trolley wheels because it is especially tough, yet not too hard. It is an established fact that excessive hardness in a trolley wheel is impracticable, for too hard a metal once an arc occurs, induces a series of arcs with disastrous consequences.

This difficulty is unknown to users of V-K Oilless Trolley Wheels. The metal from which they are made is of such a nature, (comparatively soft *yet tough*) that occasional arcs are *smoothed out,* thus preserving the perfect contour of the running groove.

This feature, coupled with a distinctive method of casting, insures absolute fidelity in design and accurate balance at all times.

The V-K Oilless Wheel used with the V-K Non-arcing Harp will reduce operating costs on your property.

Write for complete data and
a copy of our latest catalog.

More-Jones Brass & Metal Co.
St. Louis, Missouri

V-K OILLESS TROLLEY WHEEL and NON-ARCING HARP

Pres: That Safety Campaign is an excellent idea but can we put it across?

Claim Agent: I think not, with those old heavy rattly broken-down cars.

Pres: How much could you save with "Safeties"

Claim Agent: Well that depends, but the others are saving from 50 to 62 per cent and they are using safeties made in the Quality Shops of the St. Louis Car Co.,

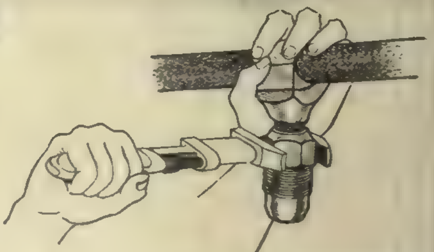
Pres: Fine, we'll order them too.

St. Louis Car Company

St. Louis, Mo.

The Birthplace of the Safety Car.

Westinghouse-Frankel Solderless Cable Taps



A splice that will stand maximum overload without injury, can be made with Westinghouse Frankel Solderless Cable Taps after a study of these illustrations.

Consider the economy. No solder or blow torch required. Experienced labor with attendant high cost eliminated and ten splices can be made in the time that it takes to make one soldered joint.

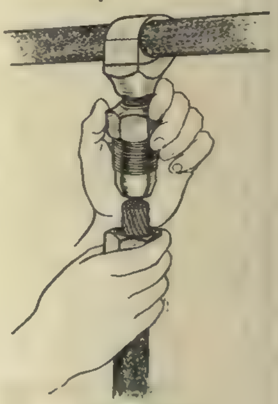
No heat is necessary. Consequently there is no injury to the insulation on either side of the joint.

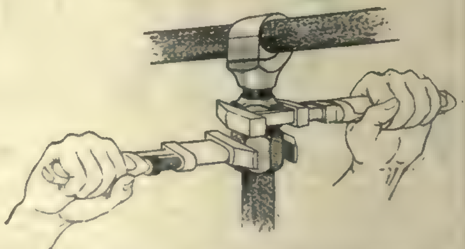
Compact and neat in appearance with no loose rings to get lost.

The sooner you stock up with Westinghouse Frankel Solderless Cable Taps, the sooner you stop a waste of time, labor, and material.

Send today for Miniature Catalogue 1-B-3.

A Strong, Dependable Splice





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FRANKEL CONNECTOR CO INC N.Y.

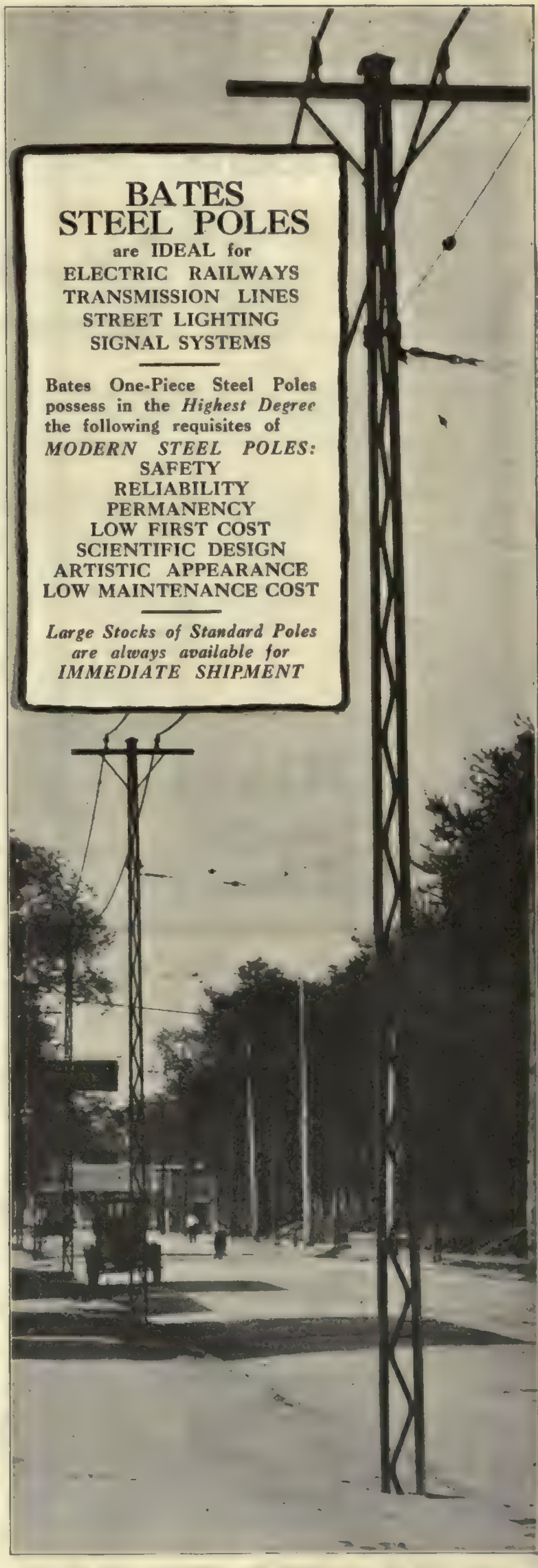
Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.
Sole Agent in the United States

Alabama

411 Elec Cars in state
of which
363 are operated by Co's.
which regularly use
"Tool Steel" gears & pinions

$\frac{363}{411} = 88\ \%$

Watch for your state!



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STEEL POLES
are IDEAL for
ELECTRIC RAILWAYS
TRANSMISSION LINES
STREET LIGHTING
SIGNAL SYSTEMS

Bates One-Piece Steel Poles possess in the *Highest Degree* the following requisites of *MODERN STEEL POLES:*
SAFETY
RELIABILITY
PERMANENCY
LOW FIRST COST
SCIENTIFIC DESIGN
ARTISTIC APPEARANCE
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Large Stocks of Standard Poles are always available for IMMEDIATE SHIPMENT

Our New 1921 TREATISE AND HANDBOOK sent upon request.

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High Speed means Low Cost

This is true of railbonding as of everything else, provided, of course that good workmanship isn't sacrificed for speed.

Figure out the number of men in your railbonding gang, check up the number of bonds they weld per day and get the cost of welding per bond.

Now compare the result with that obtained with the Erico. Two men and the Portable Erico can easily average 100 bonds per day. Do you know of any equipment that beats that record?

That's what we mean by high speed rail bonding. And a visual inspection along the line will satisfy you as to the *quality* of the work.

Write for complete data.

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Portable
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The Electric Railway
Improvement Co.
Cleveland, Ohio

Aluminum Company of America
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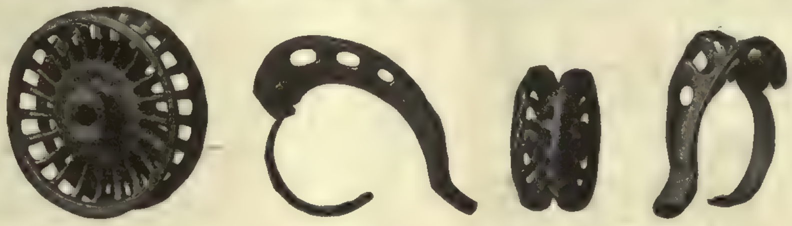
PINIONS, FLEXIBLE COUPLINGS, MINE AND INDUSTRIAL TROLLEYS



Will it be zero tomorrow?

That is possible but improbable.

However, if this question were asked, say four months from now there would be nothing improbable about it. But, if the weather is icy then and the temperature zero, will you be equipped with Nuttall Standard Sleet Wheels and Scrapers?

A great many buyers, at this time, are ordering far enough in advance to make allowance for shipping delays, and its a pretty good idea, too.

R.D.NUTTALL COMPANY
PITTSBURGH AGMA PENNSYLVANIA

"Had 5 answers to the first issue"

So the Selma Electric Railway Co., Selma, Ala., wrote us in regard to their recent ad. in the

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of
Electric Railway Journal

"SEARCHLIGHT" ads are Opportunity ads. They are watched carefully each week by the whole electric railway field.

"SEARCHLIGHT" ads cost little and invariably bring prompt returns.

For Every Business Want
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Arc-Weld Rail Bonds

See this in
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552-553-554-555
at the
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October 11-15, 1920

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PAPER INSULATED UNDERGROUND CABLE
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Americanite Rubber Covered Wire
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Galvanized Iron and Steel
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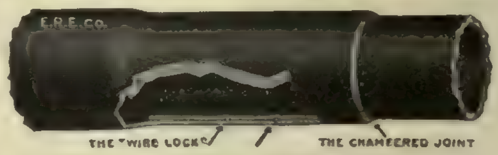
AMERICAN ELECTRICAL WORKS
Phillipsdale, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 166 1st Ave. So.

ELRECO TUBULAR POLES



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Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request.

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Copper Wire
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Transmission Line and Special Crossing Structures, Catenary Bridges

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Engineers & Contractors SYRACUSE, N. Y.

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Cummutators, Trolley Wheels, Sleet Trolley Wheels, Trolley Ears, Line Material, Controller Fingers, Brush Holders, etc.

We make quality goods.

THE EUREKA COMPANY, North East, Pa.

AETNA INSULATION LINE MATERIAL

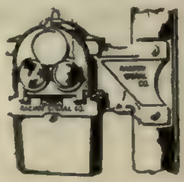
Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches.

Albert & J. M. Anderson Mfg. Co.
289-93 A Street, Boston, Mass.
Established 1877
Branches—New York, 135 B'way, Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, 48 Milton Street

Trolley Wire

INSULATED WIRES AND CABLES
WELDING WIRE WIRE STRAND
JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

AUTOMATIC SIGNALS
for Electric Railways
Highway Crossing Bells
Headway Recorders
NACHOD SIGNAL COMPANY, Inc.
LOUISVILLE, KY.



LACKAWANNA AIDS TO BETTER TRACK

See our double-page advertisement in last week's and next week's issues and send for booklets, "Lackawanna Deseamed Rails," "Improved Track Appliances," and "Track Bolts and Spikes."

Lackawanna Steel Company

General Sales Office and Works: Lackawanna, N. Y.
Atlanta Buffalo Cincinnati Detroit Philadelphia San Francisco
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Sole Exporter of Our Commercial Products, Consolidated Steel Corp., New York

U. S. ELECTRIC SIGNAL CO. WEST NEWTON, MASS.

U. S. Electric Contact Signals
for
Single-track block-signal protection
Double-track spacing and clearance signals
Protection at intersections with wyes
Proceed signals in street reconstruction work
United States Electric Signal Co.
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HIGHEST QUALITY

TRACK SPECIAL WORK

HIGHEST QUALITY SAFETY DURABILITY C F & C Co. FROGS CROSSINGS SWITCHES STANDS

WE MAKE THIS GRADE ONLY

CLEVELAND FROG & CROSSING CO.
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SPECIAL TRACK WORK

For Electric and Steam Railroads, in all types of construction
Converter and Electric Steel Castings
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Seamless Steel Gas Cylinders

WM. WHARTON JR. & CO. INCORP.

EASTON, PA.
Subsidiary of Taylor-Wharton Iron & Steel Co.
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OTHER PLANTS:
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ORIGINATORS OF MANGANESE STEEL TRACK WORK

Dependable Track Work for Electric Railways

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Frogs, Switches, Switch Stands, Crossings, Special Track Work, Machine and Drop Forgings, Pressed Steel and Hammer Work. Foundry for Manganese Steel Castings and special facilities for heat treating. Let us bid on your requirements.

ST. LOUIS FROG & SWITCH CO.
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SPECIALISTS
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Design and Manufacture
of
Standard—Insulated—and Compromise Rail Joints.

The Rail Joint Company
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BARBOUR-STOCKWELL CO.
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Established 1858

Manufacturers of
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Frogs, Crossings, Switches and Mates
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A Copper Conductor with the Strength of Steel

Copperweld Bond Wires have the strength of steel and the durability of copper. They reduce maintenance costs, are far superior to galvanized bonds, and cost less than copper bonds. Write for catalogue No. 22.

COPPER CLAD STEEL COMPANY
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WESTERN SALES REPRESENTATIVES
STEEL SALES CORPORATION CHICAGO ILL

DO YOU WANT A SALESMAN OR OTHER ASSISTANT?

If so, put an advertisement under "Positions Vacant" in the Searchlight Section. The result will be both quick and satisfactory.

Get YOUR Wants Into the Searchlight

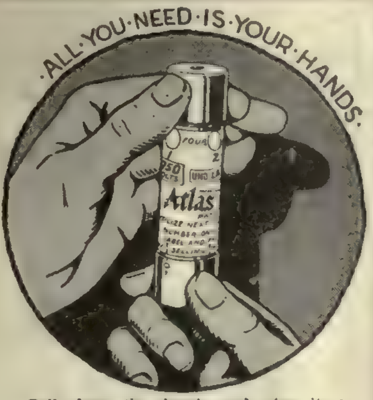
62

Peirce Forged Steel Pins with Drawn Sheet Steel Thimbles

Your best insurance against insulator breakage

Hubbard & Company
PITTSBURGH, PA.

Atlas
4-in-1 Multiple Fuse



A fuse that is not merely sold to you, but maintained in service thereafter at the lowest cost of any fuse on the market.

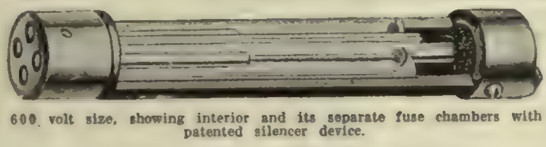
Pull down the ferrule and give it a quarter turn, bringing a new fuse element into circuit.

FOOLPROOF—Can be renewed only with self-contained elements, and it is impossible to insert any metallic substance that will render the fuse ineffective.

GUARANTEED—to operate in accordance with specifications for enclosed fuses as promulgated by Underwriters' and Factory Mutual Laboratories.

The approval labels that insure perfect performance

FM and UND. LAB. INSPECTED



600 volt size, showing interior and its separate fuse chambers with patented silencer device.

Multiple Electric Products Co., Inc.
450 Fourth Avenue, New York
Canadian Branch, Toronto, Ontario

AUTOMATIC RECLOSING CIRCUIT BREAKER

"The Circuit Breaker With Brains"

KNOWS
Not Only When to Open

But Also
WHEN TO RECLOSE

And Does It
AUTOMATICALLY

For the Sake of Decreased Operating Costs and Complete Protection to Your Equipment and Service

"Let's Get Acquainted"

THE AUTOMATIC RECLOSING CIRCUIT BREAKER CO.
COLUMBUS, OHIO

Sole Manufacturers of Full Automatic Breakers.

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Works: BARBERTON, OHIO—BAYONNE, N. J.

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DENVER, 435 Seventeenth St
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HOUSTON, TEXAS, Southern Pacific Bldg.
LOS ANGELES, I. N. Van Nuys Bldg.
NEW ORLEANS, 533 Baronne St.
PHILADELPHIA, North American Bldg.
PITTSBURGH, Farmers' Deposit Bank Bldg
SALT LAKE CITY, 705-6 Kearns Bldg.
SAN FRANCISCO, Sheldon Bldg.
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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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FOR STORING AND RECLAIMING, LOADING AND UNLOADING CARS, TRUCKS AND WAGONS
DOES THE WORK OF FROM 6 TO 12 MEN
AND KEEPS EQUIPMENT MOVING
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SPECIFY
THE TERRY TURBINE
For Driving Your Auxiliaries
TERRY STEAM TURBINE CO.
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OUR position as manufacturers enables us to produce coils, electro magnets and other similar windings under very advantageous conditions. In many cases every portion of the coil is manufactured in our plant, as for example, coils, the bobbins of which are made of BELDENMOLD, the conductor of BELDENAMEL and the taped outer winding of BELDENTAPE with BELDEN Standard Coil Leads, and BELDEN Terminals.

We will be pleased to assist in the design of coils for specific purposes whether or not we manufacture them for your needs.

Belden Manufacturing Company
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For all clamping purposes use Williams' Drop-Forged Clamps. Ask for booklet, at your dealers.

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"The Drop-Forging People"

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THE MOST SUCCESSFUL MEN IN THE ELECTRIC RAILWAY INDUSTRY READ THE ELECTRIC RAILWAY JOURNAL EVERY WEEK

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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

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GREEN CHAIN GRATES

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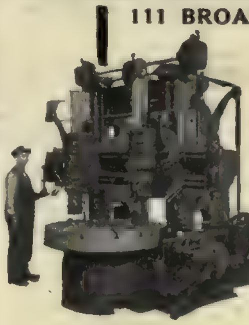
Green Pressure Water [illegible]
Green Steam Jet Ash Conveyors
Green Materials Transfer [illegible]

GREEN ENGINEERING CO., East Chicago, Ind.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut



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FOR ELECTRIC RAILWAYS

- Axle Lathes
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- Car Wheel Lathes
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"Everything in Insulation"

Mica	Waxes
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The above are only a few of our products
Write us for anything in this line you may require.

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WATER PURIFICATION SYSTEMS SOFTENING & FILTRATION FOR BOILER FEED AND ALL INDUSTRIAL USES

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Type R-10
Single Register

International Fare Registers. Single registers, round and square; double registers, duplex counters, car fittings, foot-operating devices for single and double registers. Exclusive selling agents for Heeren enamel cap and coat badges.

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Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

CONSOLIDATED CAR HEATING CO.
ALBANY, NEW YORK, CHICAGO

Heating and Ventilating

Let us demonstrate to you how we can heat and ventilate your cars at the lowest possible cost

The Cooper Heater Company
Carlisle, Pa.

BAKELITE-DILECTO

The fields of usefulness for Bakelite-Dilecto are many and varied because of its superior merit over materials heretofore available in sheets, tubes or rods. The exceptional qualities of Bakelite-Dilecto are satisfying electric railways all over the country. Investigate

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BUCKEYE JACKS

high-grade R. R. Track and Car Jacks.

The Buckeye Jack Mfg. Co.
Alliance, Ohio

The Cleveland is the practical fare box for the ONE MAN CAR. Let us tell you why.

The Cleveland Fare Box Co.
Cleveland, Ohio
Canadian Branch, Preston, Ontario

WE CAN CUT YOUR COST OF HEATING CURRENT

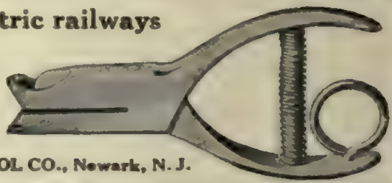
Write for THERMOSTATIC CONTROL INFORMATION

GOLD

ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
ORIGINATED the use of NON-CORROSIVE Wire for Electric Car Heaters.
ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
Gold Car Heating & Lighting Co., 17 Battery Pl., New York

75% of the electric railways
use
B-V Punches



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BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

162 RAILROADS
USE DIXIE CUP
Penny Vending Machines
To Solve their Drinking Cup Problems
in Cars and Stations
INDIVIDUAL DRINKING CUP COMPANY, INC.
HUGH MOORE, President
Original Makers of the Paper Cup — 220-230 W. 19th Street New York

"It Behooves You to Hooverize Your Motormen"

We can help you
Write to
The Arthur Power-Saving Recorder Co.
2nd National Bank Bldg., New Haven, Conn.

Keep your Eye on the SEARCHLIGHT SECTION and your advertisements in it

612

The "Hycap=Exide" Battery
for
STORAGE BATTERY
STREET CARS

THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

USG
CARBON—GRAPHITE—METAL
BRUSHES
For Car and Power House Units
MEXICAN GRAPHITE CURVE GREASE
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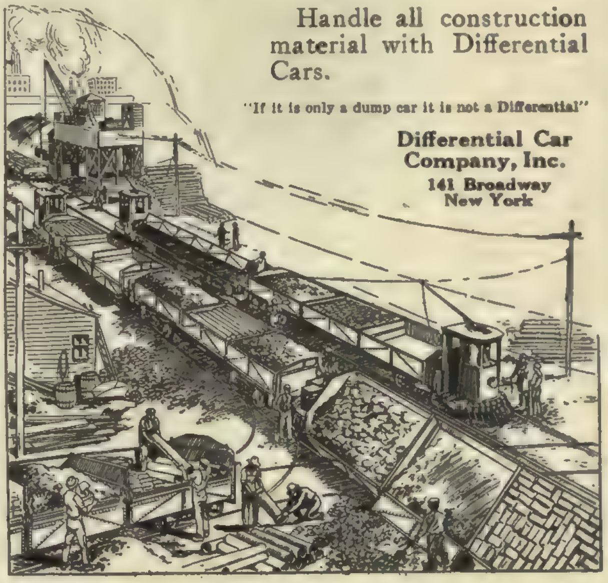
Largest Miners of Graphite on This Continent

DIFFERENTIAL
UTILITY CARS
Electric Railways!
SAVE MONEY!



Handle all construction material with Differential Cars.
"If it is only a dump car it is not a Differential"
Differential Car Company, Inc.
141 Broadway
New York

SEARCHLIGHT SECTION

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ACCOUNTANT and office executive wanted for public utiliy in Souhern New York. The position requires a man capable of directing the accounting of a public utility and also one familiar with financing and handling creditors. Man with public utility experience in New York State preferred. Apply in writing, giving age, experience, reference and whether married or single. A good position is open for the right man. P-755, Elec. Ry. Journ.

GENERAL foreman wanted for interurban shop, one who is qualified to handle all departments and obtain results generally. State experience, refernces and salary desired when replying. P-759, Elec. Ry. Journal, Old Colony Bldg., Chicago.

ELECTRICAL engineer wanted. On large interurban road, Middle West. Must be experienced in power house operation and maintenance. Give references and salary desired. P-763, Elc. Ry. Journal, Old Colony Bldg., Chicago.

EXPERIENCED car starter and inspector for street railway. Opportunity for advancement. Enclose references. P-757, Elec. Ry. Journal.

MANAGER wanted for medium sized New England property, city and suburban, entire charge of operation, maintenance, etc. State age, experience and salary expected. P-756, Elec. Ry. Journ.

MOTOR instructor wanted, thoroughly competent to instruct motormen in the proper use of air and electric equipment in an eastern city. P-753, Elec. Ry. Jour.

PERMANENT position for good car painter for city property of 100 cars in Western Pennsylvania. One able to letter and stripe. Will have charge of paint shop. State experience and salary expected. P-760, Elec. Ry. Journal, Real Estate Trust Bldg., Philadelphia.

POSITIONS VACANT

WORKING foreman wanted on small southern road running fifteen cars, city of 20,000 population. Must be first class armature winder on 506 A-2 motors. Able to handle labor; attend to general overhauling and maintenance of street railway equipment. Want reference from past and present employers. State salary wanted in answering. P-752, Eec. Ry. Jour., Real Estate Trust Bldg., Phila.

YOUNG man wanted for superintendent of small but prosperous street railway in Cuba. Must be strictly sober. Give age, experience, references and salary required. P-748, Elec. Ry. Jour.

POSITIONS WANTED

ASSISTANT engineer, track construction or maintenance, 18 years' experience on large Eastern electric road of about 1,000 miles of truck. For several years in charge of track. Special work renewals involving about 3,000 switches. PW-762, Elec. Ry. Journ.

CAPABLE master mechanic of proven executive ability, now employed, seeks opportunity to make change, where initiative and dependability are valued; 20 years' experience electric railway field, 15 years rsponsible charge of work, thoroughly competent in the construction rebuilding, maintenance and operation of equipment; very successful in handlin labor. PW-758, Elec. Ry. Journal.

MANAGER—Position as manager desired. Experience with large properties. Broad education; good address; capable of dealing with public and public officials, and handling laboring men. Good organizer. PW-764, Elec. Ry. Journal, Rialto Bldg., San Francisco.

MASTER mechanic desires to make change. 17 years' experience in all departments maintenance and construction, including Type M. and H. L. control; successful in handling labor; best of references furnished. PW-745, Elec. Ry. Journ., Real Estate Trust Bldg., Philadelphia.

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THOROUGH railroad man desires change; 12 years experience as dispatcher, motor instructor and trainmaster. Thoroughly experienced in transportation details, automatic air and multiple unit control. Can handle men successfully. Have a proven record. PW-747, Elec. Ry. Jour., Old Colony Bldg., Chicago.

AGENT AND SALESMAN

Track Supplies Salesman Available

Salesman track supplies or machines 18 years' experience on large eastern electric road of about 1,000 miles of truck. For several years in charge of track special work renewals involving about 3,000 switches. AS-761, Elec. Ry. Journal.

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Electric Railway Journal, published weekly at New York, N. Y., for Oct. 1, 1920.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the State and county aforesaid, personally appeared James H. McGraw, Jr., who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Co., Inc., Publishers of Electric Railway Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, McGraw-

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5. That the average number of copies of each issue of his publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is. (This information is required from daily publications only.)

JAMES H. McGRAW, JR.,
Secretary.

Sworn to and subscribed before me this 23rd day of Sept., 1920.

[Seal.] MARTIN J. WIEMER.

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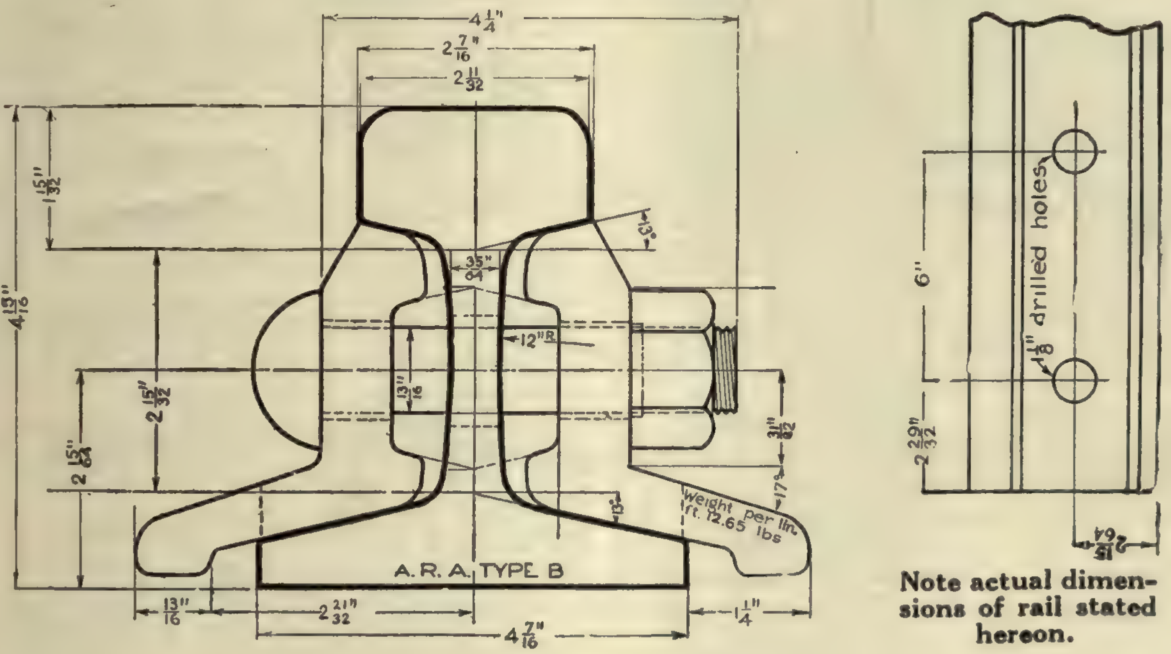

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Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
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Lackawanna Steel Co.

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Cambria Steel Co.
St. Louis Car Co.

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Bemis Car Truck Co.
Brill Co., The J. G.
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Columbia M. W. & M. I. Co.
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National Brake Co.
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St. Louis Car Co.
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Green Engineering Co.

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Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
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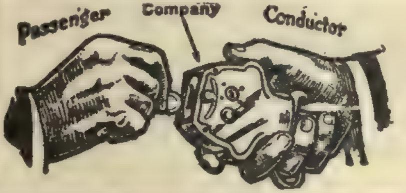

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- Brill Co., The J. G.
- Cleveland Fare Box Co.
- Economy Electric Devices Co.
- Johnson Fare Box Co.
- National Railway Appliance Co.

Fences, Woven Wire and Fence Posts
- American Steel & Wire Co.

Fenders and Wheel Guards
- Brill Co., The J. G.
- Cleveland Fare Box Co.
- Consolidated Car Fender Co.
- Electric Service Supplies Co.

Fibre and Fibre Tubing
- Continental Fibre Co.
- Johns-Manville Co., H. W.
- Westinghouse Elec. & Mfg. Co.

Field Coils (See Coils)

Filters, Water
- Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
- Castle, Inc., James M.

Floodlights
- Electric Service Supplies Co.

Flooring Composition
- American Mason Safety Tread Co.

Flooring, Grating
- Irving Iron Works

Forgings
- Columbia M. W. & M. I. Co.
- Eureka Co.
- Standard Steel Works Co.
- Williams & Co., J. H.

Frogs, Track (See Track Work)

Funnel Castings
- Wharton, Jr., & Co., Inc., Wm.

Fuses and Fuse Boxes
- Chicago Fuse Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Multiple Elec. Products Co.
- Westinghouse Elec. & Mfg. Co.
- Williams & Co., J. H.

Fuses, Refillable
- Chicago Fuse Mfg. Co.
- Columbia M. W. & M. I. Co.
- General Electric Co.

Gages, Oil and Water
- Ohio Brass Co.

Gaskets
- Power Specialty Co.
- Westinghouse Traction Brake Co.

Gas-Electric Cars
- General Electric Co.

Gas Producers
- Westinghouse Elec. & Mfg. Co.

Gates, Car
- Brill Co., The J. G.

Gear Blanks
- Standard Steel Works Co.

Gear Cases
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Westinghouse Elec. & Mfg. Co.

Gears and Pinions
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- General Electric Co.
- National Railway Appliance Co
- Nuttall Co., R. D.
- Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
- General Electric Co.

Generators
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Gongs (See Bells and Gongs)

Grates, Chain
- Green Eng. Co.

Greases (See Lubricants)

Grinders and Grinding Supplies
- Metal & Thermit Corp.
- Railway Track-work Co.

Grinding Blocks and Wheels
- Railway Track-work Co.

Guards, Trolley
- Electric Service Supplies Co.
- Ohio Brass Co.

Harps, Trolley
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- More-Jones B. & M. Co.
- Nuttall Co., R. D.
- Star Brass Works

Headlights
- Electric Service Supplies Co.
- General Electric Co.
- Ohio Brass Co.
- St. Louis Car Co.

Heaters, Car (Electric)
- Consolidated Car Heating Co.
- Gold Car Heating & Lighting Co.
- National Ry. Appliance Co.
- Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water
- Cooper Heater Co.
- Smith Heater Co., Peter

Heaters, Car (Stove)
- Electric Service Supplies Co.
- Smith Heater Co., Peter

Hoists and Lifts
- Columbia M. W. & M. I. Co.
- Ford-Chain Block Co.
- Niles-Bement-Pond Co.

Hose
- Ingersoll-Rand Co.

Hose, Bridges
- Ohio Brass Co.

Hydraulic Machinery
- Niles-Bement-Pond Co.

Inspection
- Electrical Testing Lab's

Instruments, Measuring, Testing and Recording
- Economy Electric Devices Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Weston Elec. Instrument Co.

Insulating Cloth, Paper and Tape
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Insulation (See also Paints)
- Anderson Mfg. Co., A. & J. M.
- Electric Ry. Equipment Co.
- Electric Service Supplies Co.
- General Electric Co.
- Mitchell-Rand Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

Insulators (See also Line Material)
- Anderson Mfg. Co., A. & J. M.
- Drew Electric & Mfg. Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- General Electric Co.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Insulator Pins
- Electric Service Supplies Co.
- Hubbard & Co.

Jacks (See also Cranes, Hoists and Lifts)
- Brill Co., The J. G.
- Buckeye Jack Mfg. Co.
- Columbia M. W. & M. I. Co.

Joints, Rail
- Rail Joint Co.
- Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
- Bemis Car Truck Co.
- Brill Co., J. G.

Lamp Guards and Fixtures
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent (See also Headlights)
- Anderson Mfg. Co., A. & J M.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
- Ohio Brass Co.

Lathe Attachments
- Williams & Co., J. H.

Lathes, Car Wheel
- Niles-Bement-Pond Co.

Lightning Protection
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
- Anderson Mfg. Co., A. & J. M.
- Archbold-Brady Co.
- Columbia M. W. & M. I. Co.
- Drew Electric & Mfg. Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co
- Eureka Co.
- General Electric Co.
- Hubbard & Co.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Loaders, Wagon, Truck or Car
- Portable Machinery Co.

Locking Spring Boxes
- Wharton, Jr., & Co., Wm.

Locomotives, Electric
- Brill Co., The J. G.
- General Electric Co.
- McGuire-Cummings Mfg. Co.
- Westinghouse Elec. & Mfg. Co.

Lubricating Engineers
- Galena-Signal Oil Co.

Lubricants, Oil and Grease
- Galena-Signal Oil Co.

Machine Tools
- Columbia M. W. & M. I. Co.
- Niles-Bement-Pond Co.

Machine Work
- Columbia M. W. & M. I. Co.

Magnet Wire
- Belden Mfg. Co.

Manganese Steel Castings
- Wharton, Jr., & Co., Wm.

Manganese Steel Special Track Work
- Wharton, Jr., & Co., Wm.

Meters, Car, Watt-Hour
- Economy Electric Devices Co.

Meters (See Instruments)
- Electric Service Suppiies Co.

Mirrors for Motormen
- Drew Elec. & Mfg. Co.

Molded Insulators and Parts
- Belden Mfg. Co.

Motormen's Seats
- Electric Service Supplies Co.
- Wood Co., Chas. N.

Motors, Electric
- Westinghouse Elec. & Mfg. Co.

Motors and Generators, Sets
- General Electric Co.

Nuts and Bolts
- Barbour-Stockwell Co.
- Bemis Car Truck Co.
- Columbia M. W. & M. I. Co.
- Hubbard & Co.

Ohmmeters
- Weston Elect'l Instrument Co.

Oils (See Lubricants)

Packing
- Westinghouse Elec. & Mfg. Co.

Paints and Varnishes (Insulating)
- Mitchell-Rand Mfg. Co.

Paints and Varnishes for Woodwork
- National Ry. Appliance Co.

Paving Material
- American Brake Shoe & Fdry. Co.
- Barrett Co., The

Paving Pitch
- Barrett Co., The

Pickups, Trolley Wire
- Electric Service Supplies Co.
- Ohio Brass Co.

Pinion Pullers
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- General Electric Co.
- Wood Co., Chas. N.

Pinions (See Gears)

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- Bemis Car Truck Co.
- Electric Service Supplies Co.
- Ohio Brass Co.
- Westinghouse Traction Brake Co.

Pipe Fittings
- Power Specialty Co.
- Standard Steel Works Co.
- Westinghouse Traction Brake Co.

Planers (See Machine Tools)

Pliers, Insulated
- Electric Service Supplies Co.

Pneumatic Tools
- Ingersoll-Rand Co.

Pole Reinforcing
- Hubbard & Co.

Poles, Metal Street
- Bates Expanded Steel Truss Co.
- Electric Railway Equipment Co.
- Hubbard & Co.

Pole Sleeves
- Drew Elec. & Mfg. Co.

Poles, Trolley
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Nuttall Co., R. D.

Poles, Tubular Steel
- Electric Railway Equipment Co.

Power Saving Devices
- Arthur Power-Saving Recorder Co.
- Economy Electric Devices Co.
- National Ry. Appliance Co.

Preservatives
- Barrett Co., The

Pressure Regulators
- General Electric Co.
- Ohio Brass Co.
- Westinghouse Elec. & Mfg. Co.

Pumps
- Schutte & Koerting Co.

Punches, Ticket
- Bonney-Vehslage Tool Co.
- International Register Co., The
- Wood Co., Chas. N.

Purifiers, Feed Water
- Scaife & Sons Co., Wm. B.

Rails
- Foster Co., L. B.
- Lackawanna Steel Co.

Rails, New
- Cambria Steel Co.

Rail Grinders (See Grinders)

Rail Joint Plates
- Lackawanna Steel Co.

Rail Welding (See Brazing and Welding Processes)
- Rail Welding and Bonding Co.

Rails, Relaying
- Foster Co., L. B.
- Zelnicker, Walter A., Supply Co., Inc.

Railway Safety Switches
- Westinghouse Elec. & Mfg. Co.

Rattan
- Brill Co., The J. G.
- Electric Service Supplies Co.
- McGuire-Cummings Mfg. Co.
- St. Louis Car Co.

Recorders, Power-Saving
- Arthur Power-Saving Recorder Co.

Registers and Fttings
- Brill Co., The J. G.
- Electric Service Supplies Co.
- International Register Co., The
- Rooke Automatic Register Co.

Reinforcement, Concrete
- American Steel & Wire Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.

Repair Work (See also Coils)
- Cleveland Armature Works
- Columbia M. W. & M. I. Co.
- General Electric Co.
- Independent Lamp & Wire Co.
- Westinghouse Elec. & Mfg. Co.

Replacers, Car
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co

Resistance, Grid
- Columbia M. W. & M. I. Co.

Resistance, Wire and Tube
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Retrievers, Trolley (See Catchers and Retrievers, Trolley)

Rheostats
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Roofing, Building
- Barrett Co., The

Rubber Covered Wires and Cables
- Belden Mfg. Co.

Sanders, Track
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Ohio Brass Co.
- St. Louis Car Co

Sash Fixtures, Car
- Brill Co., The J. G

Schools, Correspondence
- Amer. School of Correspondence

Scrapers, Track (See Cleaners and Scrapers, Track)

Seats, Car (See also Rattan)
- Brill Co., The J. G.
- St. Louis Car Co.

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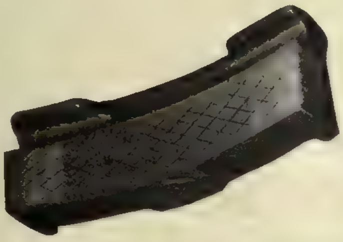

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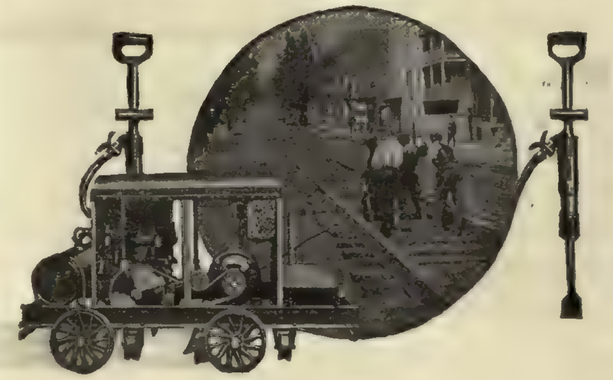

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- Cleveland Armature Works
- Foster Co., L. B.
- Hyman Michaels Co.
- Zelnicker Supply Co., Inc., Walter A.

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- Brill Co., The J. G

Shovels
- Brill Co., The J. G
- Hubbard & Co.

Signals, Car Starting
- Consolidated Car Heating Co.
- Electric Service Supplies Co.
- National Pneumatic Co., Inc.

Signal Systems, Block
- Electric Service Supplies Co.
- Nachod Signal Co., Inc.
- U. S. Electric Signal Co.
- Wood Co., Chas. N.

Signal Systems, Highway Crossing
- Nachod Signal Co., Inc.
- U. S. Electric Signal Co.

Slack Adjusters (See Brake Adjusters)

Slag
- Carnegie Steel Co.

Sleet Wheels and Cutters
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Drew Electric & Mfg. Co.
- Electric Railway Equipment Co.
- More-Jones Brass & Metal Co.
- Nuttall Co., R. D.

Snow-Plows, Sweepers and Brooms
- Brill Co., The J. G.
- Columbia M. W. & M. I. Co.
- Consolidated Car Fender Co.
- McGuire-Cummings Mfg. Co.

Soldering and Brazing Apparatus (See Welding Processes and Apparatus)

Solderless Connectors
- Frankel Connector Co.

Spikes
- American Steel & Wire Co

Splicing Compounds
- Westinghouse Elec. & Mfg. Co.

Splicing Sleeves (See Clamps and Connectors)

Springs, Car and Truck
- American Steel Foundries
- American Steel & Wire Co.
- Bemis Car Truck Co.
- Brill Co., The J. G.
- Standard Steel Works Co.

Sprinklers, Track and Road
- Brill Co., The J. G.
- McGuire-Cummings Mfg. Co.
- St. Louis Car Co.

Steel Castings
- Wharton, Jr., & Co., Wm.

Steps, Car
- American Mason Safety Tread Co.
- Irving Iron Works
- Universal Safety Tread Co.

Steps, Ladder and Stairs (non-slipping)
- Irving Iron Works

Steps, Safety
- Irving Iron Works

Stokers, Mechanical
- Babcock & Wilcox Co.
- Green Engrg. Co.
- Westinghouse Elec. & Mfg. Co.

Storage Batteries (See Batteries, Storage)

Strand
- Copper Clad Steel Co.
- Roebling's Sons Co., J. A.

Structural Steel
- Lackawanna Steel Co.

Subway Grating
- Irving Iron Works

Superheaters
- Babcock & Wilcox Co.
- Power Specialty Co.

Sweepers, Snow (See Snow Plows, Sweepers and Brooms)

Switch Stands
- Ramapo Iron Works

Switches, Track (See Track Special Work)

Switchboxes
- Chicago Fuse Mfg. Co.

Switches and Switchboards
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Synchroscopes
- Weston Elec'l Instrument Co.

Tampers, Tie
- Ingersoll-Rand Co.

Tanks, Ash and Coal Storage
- Green Engineering Co.

Tapes and Cloths (See Insulating Cloth, Paper and Tape)

Telephones and Parts
- Electric Service Supplies Co.

Testing, Commercial and Electrical
- Elec'l Testing Laboratories

Testing Instruments (See Instruments, Electrical Measuring, Testing, etc.)

Thermostats
- Consolidated Car Heating Co.
- Gold Car Heating & Lighting Co.
- Railway Utility Co.
- Smith Heater Co., Peter

Ticket Choppers and Destroyers
- Electric Service Supplies Co.

Tie Plates
- Cambria Steel Co.
- Lackawanna Steel Co.

Ties, Mechanical
- Dayton Mechanical Tie Co.

Ties and Tie Rods, Steel
- Barbour-Stockwell Co.
- International Steel Tie Co.

Ties, Wood Cross (See Poles, Ties, Posts, etc.)

Tongue Switches
- Wharton, Jr., & Co., Wm.

Tool Holders
- Williams & Co., J. H.

Tool Steel
- Carnegie Steel Co.

Tools, Thread Cutting
- Williams & Co., J. H.

Tools, Track and Miscellaneous
- American Steel & Wire Co
- Columbia M. W. & M. I. Co.
- Electric Service Supplies Co.
- Hubbard & Co.
- Railway Track-work Co.

Towers and Transmission Structures
- Archbold-Brady Co.
- Bates Expanded Steel Truss Co.
- Westinghouse Elec. & Mfg. Co.

Track Bolts and Spikes
- Lackawanna Steel Co.

Track Expansion Joints
- Wharton, Jr., & Co., Wm.

Track, Special Work
- Barbour-Stockwell Co.
- Cleveland Frog & Crossing Co.
- Columbia M. W. & M. I. Co.
- Engel & Hevenor
- Ramapo Iron Works
- St. Louis Frog & Switch Co.
- Wharton, Jr., & Co., Inc., Wm.

Transfer Tables
- Archbold-Brady Co.

Transfers (See Tickets)

Transformers
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.

Treads, Safety, Stair, Car Step
- American Mason Safety Tread Co.
- Universal Safety Tread Co.

Trolley Bases
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- Nuttall Co., R. D.
- Ohio Brass Co.

Trolley Wire
- Anaconda Copper Mining Co.
- Bridgeport Brass Co.
- Copper Clad Steel Co.

Trolley Bases, Retrieving
- Anderson Mfg. Co., A. & J. M.
- Electric Service Supplies Co.
- General Electric Co.
- Nuttall Co., R. D.
- Ohio Brass Co.

Trolleys and Trolley Systems
- Ford Chain Block Co.

Trolley Wheels (See Wheels, Trolley)

Trolley Wire
- American Steel & Wire Co.
- Roebling's Sons Co., John A.

Trucks, Car
- American Steel Foundries
- Bemis Car Truck Co.
- Brill Co., The J. G.
- McGuire-Cummings Mfg. Co.
- St. Louis Car Co.

Turbines, Steam
- General Electric Co.
- Terry Steam Turbine Co.
- Westinghouse Elec. & Mfg. Co.

Turnstiles
- Perey Mfg. Co., Inc.

Valves
- Ohio Brass Co.
- Westinghouse Traction Brake Co

Vending Machines, Drinking Cup
- Individual Drinking Cup Co., Inc.

Ventilators, Car
- Brill Co., The J. G.
- National Railway Appliance Co.
- Railway Utility Co.
- St. Louis Car Co.

Vises, Pipe
- Williams & Co., J. H.

Voltmeters (See Instruments)
- Weston Elec. Instrument Co.

Water Softening & Purifying Systems
- Scaife & Sons Co., Wm. B.

Wattmeters
- Weston Elec'l Instrument Co.

Welded Rail Joints
- Rail Welding & Bonding Co.

Welders, Portable Electric
- Electric Railway Improvement Co.
- Rail Welding & Bonding Co.

Welding Processes and Apparatus
- Electric Railway Improvement Co.
- General Electric Co.
- Metal & Thermit Corp.
- Rail Welding & Bonding Co.
- Westinghouse Elec. & Mfg. Co.

Wheel Guards (See Fenders and Wheel Guards)

Wheel Presses (See Machine Tools)

Wheels, Car, Cast Iron
- Bemis Car Truck Co
- Griffin Wheel Co.

Wheels, Car, Steel and Steel Tired
- American Steel Foundries
- Bemis Car Truck Co.
- Standard Steel Works Co.

Wheels, Trolley
- Anderson Mfg. Co., A. & J. M.
- Columbia M. W. & M. I. Co.
- Electric Railway Equipment Co.
- Electric Service Supplies Co.
- Eureka Co.
- General Electric Co.
- More-Jones B. & M. Co.
- Nuttall Co., R. D.
- Star Brass Works

Whistles, Air
- General Electric Co.
- Ohio Brass Co.
- Westinghouse Traction Brake Co

Wire Rope
- American Steel & Wire Co.
- Copper Clad Steel Co.
- Roebling's Sons Co., John A.

Wires and Cables
- Aluminum Co. of America
- American Elec'l Works
- American Steel & Wire Co.
- Anaconda Copper Mining Co.
- Belden Mfg. Co.
- Bridgeport Brass Co.
- Copper Clad Steel Co.
- General Electric Co.
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- Roebling's Sons Co., John A.
- Westinghouse Elec. & Mfg. Co.

Wood Preservatives
- Barrett Co., The

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- Williams & Co., J. H.

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613

Felling the Western red cedar in the woods of the great Pacific Slope.

Peeling, scaling and inspecting Western red cedar poles in woods, Washington.

Manufacturing the cedar pole.

Poles awaiting cars for shipment to concentration yards.

Barrett TRADE B MARK
Carbosota
Grade-One Liquid
Creosote Oil

A Pole Story with a Moral

THESE original photographs show the whole production of creosoted (butt-treated) cedar poles.

Decay is largely responsible for the present extensive reconstruction of transmission lines. Unless preservative treatment is adopted the same experience will be repeated until the pole supply is exhausted.

Carbosoted cedar poles have become the standard for the best type of transmission line because of their natural suitability and the permanence of the Carbosota treatment as a protection against decay.

For full information write for folder No. 406.

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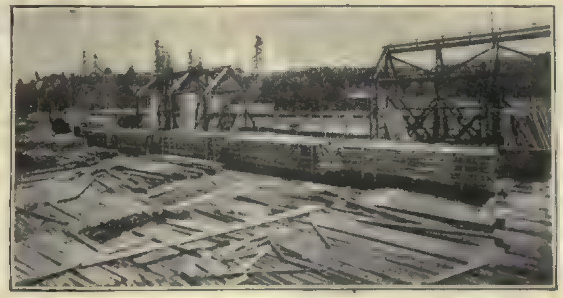
Western red cedar poles, 100 ft. long, awaiting unloading at Everett, Wash.

S. S. William Chatham ready to cast off at Everett with largest cargo of poles ever exported from U. S.

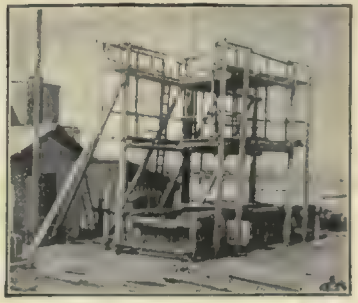
Poles piled for seasoning in concentration yard.

Trainload of butt-treated Western red cedar poles leaving treating plant.

Open Tank process creosoting plant of the Western Pole Preservers, Sandpoint, Idaho.



5 cars butt-treated Western red cedar poles after loading from treating tank. National Pole Co., Everett, Wash.



One of the Open Tank process pole creosoting plants of Baxter & Jordan, Wilmington, Calif.

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Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
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IRVING SAFSTEP
(PATENTED) REG U.S. PAT. OFF.
ABSOLUTELY NON-SLIPPING ALWAYS

Write for Catalog 2A28

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cars and station steps.

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Wants

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the equipment or machinery that you are not using. This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

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Automatic Safety and Automatic Return Switch Stands for Passing Sidings. Tee Rail Special Work for Interurban Lines and Private Rights of Way. Manganese Construction a Specialty.

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Bemis Trucks	Manganese Brake Heads
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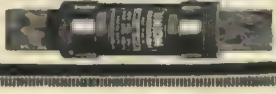
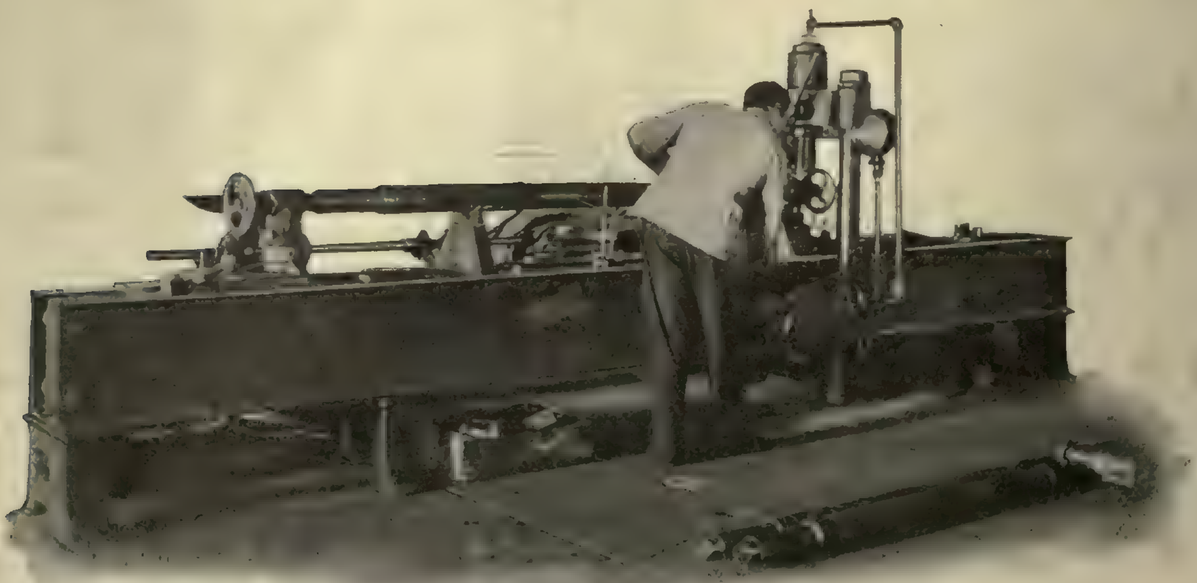


COLUMBIA



Columbia Axle Straightener in the Shop of the Third Ave. Railway System, New York

Hydraulically Operated Axle Straighteners for axles and shafts to 6 in. diameters

Many of the biggest electric railway shops make good use of this fine equipment.

One reason for its efficiency is the fact that the center heads remain in the same position during the entire straigtening process.

An inside spring in the center heads takes up the pressure at the ends of the shaft, making the result just mentioned a certainty in every operation. Better work is done which cuts costs materially.

Can you use any other Columbia Specialties?

The Columbia Machine Works & Malleable Iron Company

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- Armature and axle bearings
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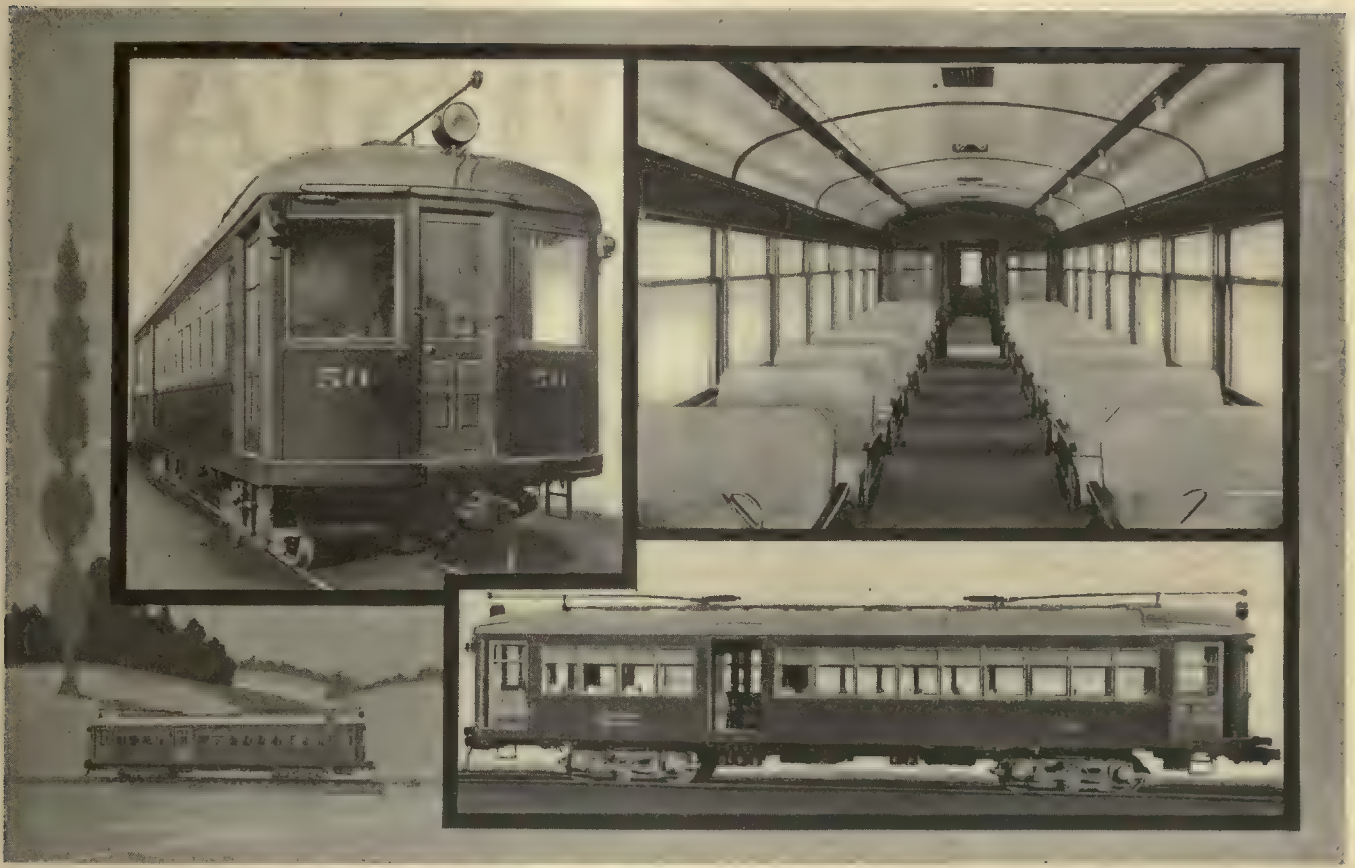


Capacious Interurban Car

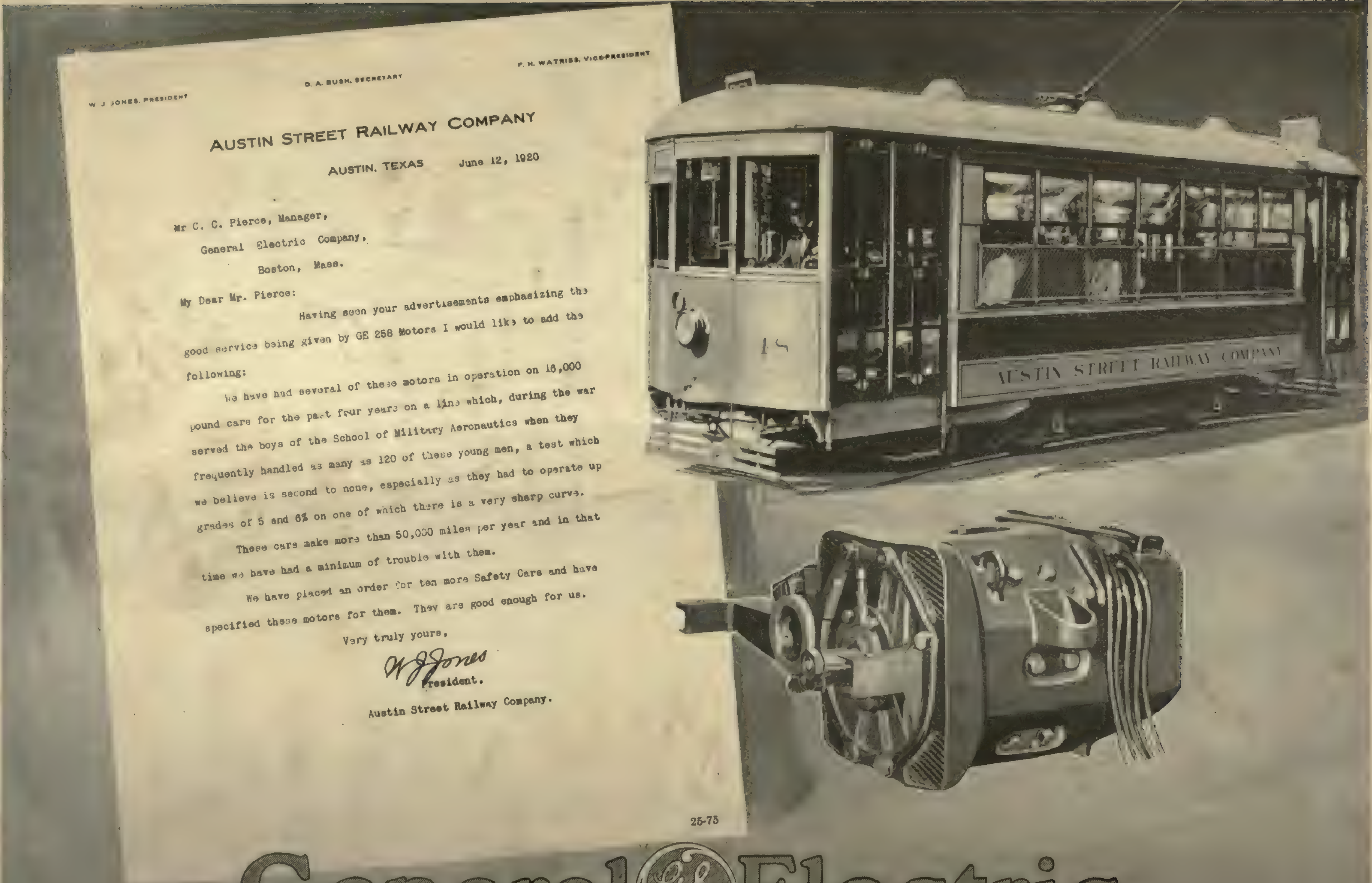
One of the most impressive types of interurban cars was recently constructed at the Brill Works for the Philadelphia & Western Railway Company. It measures 55 ft. over bumpers, has an overall width of 10 ft. 6 in. and weighs, including electrical and air equipment, approximately 78,000 lb.

A better idea of its capaciousness is obtained from the illustration of the interior. The Brill "Winner" Reversible-back Seats have cushions 40 in. long and the aisle is 26¼ in. wide.

It is mounted on Brill High-speed Trucks, No. 27-MCB-3 and is equipped for both third rail and trolley operation.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. — G. C. KUHLMAN CAR CO. — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO. SPRINGFIELD, MASS.



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AUSTIN, TEXAS June 12, 1920

Mr C. C. Pierce, Manager,
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Boston, Mass.

My Dear Mr. Pierce:

Having seen your advertisements emphasizing the good service being given by GE 258 Motors I would like to add the following:

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These cars make more than 50,000 miles per year and in that time we have had a minimum of trouble with them.

We have placed an order for ten more Safety Cars and have specified these motors for them. They are good enough for us.

Very truly yours,

W J Jones
President.

Austin Street Railway Company.

25-75

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
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raw-Hill Co., Inc. *Monthly Mechanical and Engineering Edition* October 23, 1920

ELECTRIC RAILWAY JOURNAL

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STEEL WHEELS
for Electric Railways

are best because of their reliability and long period of service. We have the facts and figures on the economies you can effect by the use of our circular rolled and forged sections, axles and other products. Ask for them.

HOUSTON

IDVALE STEEL AND ORDNANCE CO. CAMBRIA STEEL COMPANY

Baldwin-Westinghouse Standard Electric Locomotives

Built for all classes of electric railway service, low-speed and high-speed, in the following standard sizes:

Class A—25 to 30 Tons
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Among the roads that have recently adopted Baldwin-Westinghouse Standard Locomotives, or duplicated previous orders, are:—

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Sand Springs	1—50 ton
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Central Li Mones, Cuba	2—60 ton
Sacramento Northern	2—60 ton
Pacific Electric	2—60 ton

Address either Company

The Baldwin Locomotive Works
Philadelphia, Pa.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Vol. 56, *No.* 17 New York, October 23, 1920 *Pages* 855-904

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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Martin Schreiber outlines the general principles to be followed in dividing and deputizing executive duties. Application of these principles on public service railway property at Camden, N. J. 858

Shop and Park Notes from Spokane

Washington Water Power Company operates one-man double-truck cars successfully. Also has Natatorium Park, which is one of the few parks in the country that pays 860

What Happens at the Electric Car Trolley Contact?

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Circulation of this issue, 7,450 copies

Advertising Indexes—Alphabetical, 46; Classified, 40, 42, 44; Searchlight Section, 36-39

Two of the new 250 Safety Cars recently purchased by the Eastern Massachusetts (Bay State) Street Ry., all of which carry "Bungalow" air compressors.

"Bungalow" Type Air Compressor

250 "Bungalow" air compressors selected by Largest Electric Railway Line

All the largest orders for Safety Cars include the "Bungalow" air compressor —Brooklyn, 200; Eastern Massachusetts, 250; Public Service Corpoation of New Jersey, 200. The highly satisfactory service rendered by this dependable machine resulted in its selection.

Its light weight, low build, compact and rugged form—and above all, its absolute dependability, recommends the "Bungalow" to exacting electric railway service.

Not only the large systems select the "Bungalow," but many smaller ones as well. The "Bungalow" is installed on 3306 Safety Cars operating on 185 different electric railways in the United States.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

New York
San Francisco

Washington

Chicago
St. Louis

Does this apply to your property?

In discussing the possibilities of Safety Cars from the standpoint of reducing operating costs, a writer in a metropolitan daily has this to say:

> "Take a look at the line on ....street. There, as on other lines, two men are assigned to operate the car, and two men on this street appear to a novice to be an unnecessary waste of money. The car operates through a thinly populated section and the conductor has little or nothing of value to do which the motorman could not do as well. This reference is to only one line. There are others in the same class.
>
> On such lines, and possibly on others, no good reason has been found in several days' search why the company should not use one man cars. That would indicate a desire to offset the high and increasing cost of operation."
>
> And Safety Cars *do* reduce operating costs, as evidenced by the fact that more than 200 electric railways in the United States are now using them.

But remember—it is a safety car only when equipped with automatic, laborless apparatus, so interlocked that, regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sand apply immediately thereafter and the doors unlock for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed before the car can start, and when the air brake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

SAFETY CAR DEVICES COMPANY

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO	WASHINGTON, D. C.	NEW YORK	PITTSBURGH	SAN FRANCISCO
Railway Exchange Bldg.	Munsey Bldg.	City Investment Bldg.	Westinghouse Bldg.	Southern Pacific Bldg.

CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.

Phono-Electric

For City or Interurban Car Requirements

Because this No. 00 round wire is Phono-Electric Trolley Wire, there is no question that it will continue to make good for years at this intersection, where trains of the big Seattle interurban cars pass over the city tracks.

Naturally, these big-car trains draw heavier amperage than ordinary cars, but the ability of Phono-Electric to withstand high "drafts"—which means high temperature, without losing its remarkable strength and toughness (and without permanent elongation) insure a far longer period of uninterrupted service than would be possible with any other practicable conductor.

Bridgeport Brass Company
Bridgeport Connecticut

"You are paying more for poor bonding than good bonding costs"

A poorly bonded joint has exactly the same effect as a resistance unit cut into the feeder line. Voltage drops and power is consumed. Multiply this double loss by hundreds or thousands of joints.

The energy loss swells the fuel of power bill. Low voltage slows up the cars and causes burnt-out armatures.

GOOD BONDING PAYS. O-B BONDS ARE GOOD BONDS.

O-B BONDS FOR ALL CONDITIONS

Type AW-3 Bond for Ball of Rail.
Also made for Base of Rail

O-B Arc-Weld Bonds

Welded to the rail by the electric arc. They may be applied by the O-B Welding Machine or with most any other make of welder.

The copper terminal is completely encircled by a steel sleeve welded in place at the factory. When installing the bond, the operator welds "Steel to Steel with Steel," the ideal condition for good welding.

Welding surface of the bond forms a 90 deg. angle with the rail. This is essential for good welding.

Full details are given in new book "Arc-Weld Bonding."

Type F-3 Bond
Concealed Type of Bond, installed under splice bar

Type E-2 Bond
A long bond for around the splice bar. Especially valuable on joints where rail movement is considerable

O-B Stud Terminal Bonds

These O-B Bonds are made either with compressed or pin expanded terminals.

Complete listing of capacities and lengths is given in O-B General Catalog.

Type ST-2 Bond with steel-armored Terminals.

O-B Gas Weld Bonds

Made with all copper or with steel-armored copper terminal. Both are welded to the rail by use of the oxy-acetylene flame.

The welding surface forms a right angle with the rail. The weld is built up in plain sight. When finished, the terminal tapers towards the head of the rail and, consequently, is seldom damaged by traffic.

Our booklet "Gas-Weld Bonding" tells the whole story.

Type J Bond

O-B Type J Bonds

Installed on the ball of the rail by driving with a hammer into an annular hole drilled with the electrically operated milling machine.

Low installation costs and lasting contact are features of Type J Bonds.

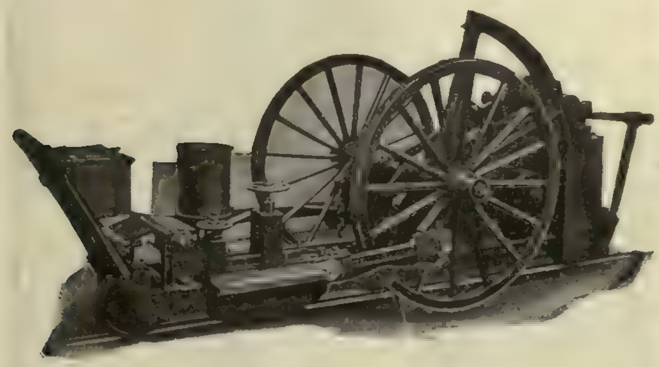
"The Return Circuit" is full of handy charts and useful bonding information.

The Ohio Brass Company, Mansfield, Ohio

New York, Philadelphia, Chicago,
Pittsburgh, Los Angeles, San Francisco,
Paris, France

Manufactures: Trolley Materials,
Rail Bonds, High Tension Insulators,
Third Rail Insulators.

Rotary or Reciprocating



Reciprocating Track Grinder

A Grinder for every need

What kind of a grinder do you need?

That depends entirely upon the condition of your track and the work being done or contemplated.

FOR removing rail corrugations and grinding new or slightly cupped joints and special work, the Reciprocating Track Grinder is easily the best. Through the planetary action of this grinder only the minimum of metal and consequent life is removed from the rail head in attaining a smooth tractive surface at least cost of operation.

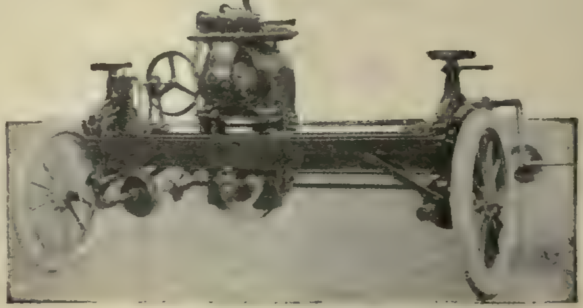
Atlas Rail Grinder

THE Atlas Rail Grinder employs the rotating grinding wheel method of operation and is used with good results for removing the surplus metal used to build up low joints by means of arc welding.

It is low in first cost. It is simple to operate, will last a life time and permit of high efficiency.

Universal Rotary Track Grinder

THE Universal Rotary Track Grinder is built along the lines of the Atlas Rail Grinder but has several additional features of advantage and improvement, justifying the slight additional first cost. Its advantages can be summed up as follows: Tilted grinding wheel; Outward bearing on grinding wheel arbor for stability; Adjustable outrigger; Large Pneumatic derail wheels; Three point suspension of bronze bearing of grinding wheel arbor for stability of wheel; Simple adjustments; Ease of operation; Low working economy and upkeep.



Universal Rotary Track Grinder

RAILWAY TRACK-WORK CO.
3132-48 East Thompson St., Philadelphia, Pa.

EXCLUSIVE AGENTS:

ATLAS RAILWAY SUPPLY CO.
Chicago, Ill.

ELECTRICAL ENGINEERING & MANUFACTURING CO.
Pittsburgh, Pa.

CHAS. N. WOOD CO.
Boston, Mass.

HITCHCOCK, LLOYD & CO., Inc.,
77A Queen Victoria St., E. C.
London, England

63% for Bearing and 37% for Reinforcement

IN Steel Twin Ties the economical distribution of Steel under the work a tie is called on to do takes these percentages.

The larger proportion of the Steel goes into the Three-Foot by Thirteen-Inch Bearing Plates, which are Five-sixteenths Inch thick. Flanged sides provide for stresses in the plates and in combination with the Three-Foot-Long Bearing utilize all the Steel in them.

The smaller, but equally important, proportion goes into the Three-Inch Channels, which weigh Four Pounds to the foot.

They space the rail so accurately that no gauge is needed in laying Steel Twin Ties.

They also reinforce the track foundation at Three-Foot Intervals.

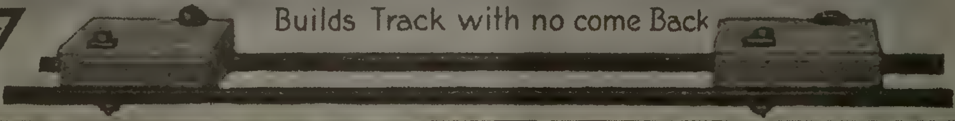
This efficient distribution of Steel is the fundamental principle of permanent, proved construction at less first cost than wood tie probabilities.

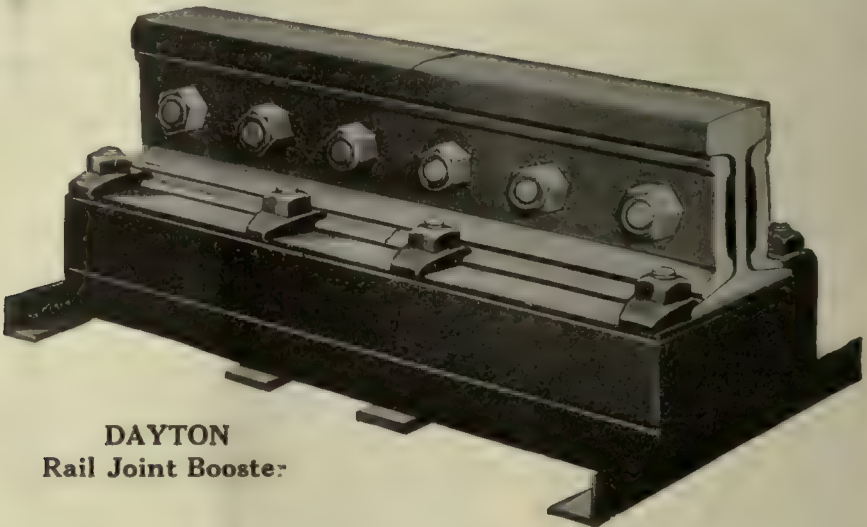
The International Steel Tie Company
Manufacturers of Steel Twin Ties and Crossing Foundations
16702 Waterloo Road CLEVELAND, O.

Steel Twin Tie Track

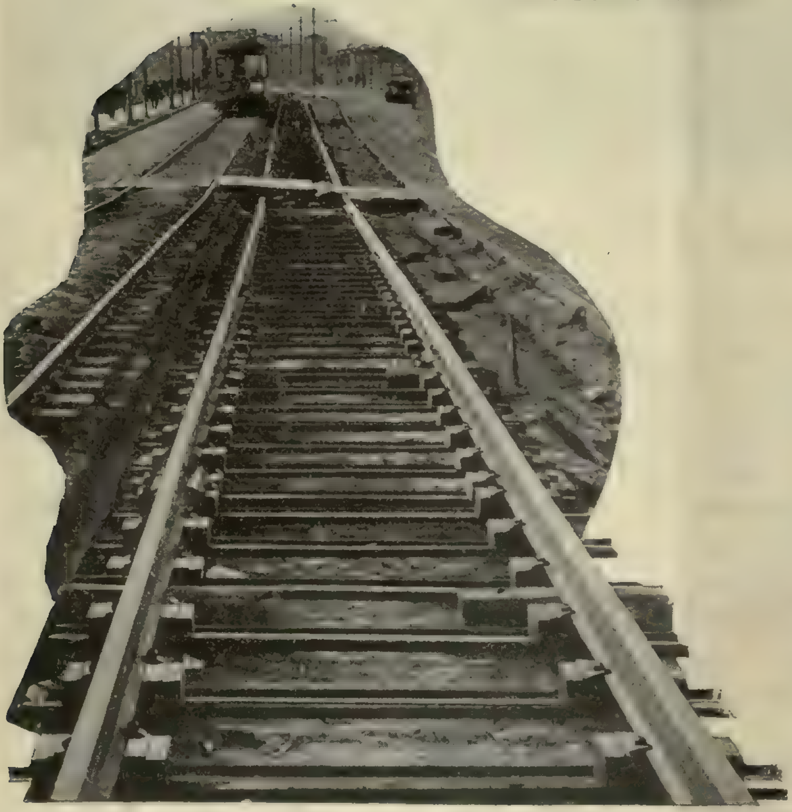
The RESILIENT RAILWAY TIE

Builds Track with no come Back





DAYTON
Rail Joint Booster



As the rubber heel acts as a buffer for the human body, so the asphalt cushion in the Resilient Railway Tie acts as a buffer for your track foundation, and your rolling stock. It absorbs the hammer blows, which unless dissipated destroys your track foundation, causes the paving to loosen and break, plays havoc with the rolling stock and shatters your patrons nerves. This shock absorber is found in the Resilient Railway Ties and Joint Boosters. A trial of the "Joint Booster" now on old track will convince you, what a new track with Resiliency applied throughout will be.

—the secret is Resiliency!

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

SHELBY POLES

Genuine "Shelby" Seamless Cold Drawn Trolley Poles

In the design of the Shelby trolley poles, minimum weight combined with ample strength is secured by the use of a reinforcement on the inside and at the base. This reinforcing member being made integral with the pole and of the same 13 gauge selected grade open hearth steel.

The Shelby pole is made in two designs—Standard A, for all ordinary service and the lightest pole it is practicable to manufacture or use—Standard B, with long reinforcing, intended to meet the most severe service conditions.

Special designs made to meet special requirements.

A new booklet just off the press gives specifications in detail and describes the method of testing these poles before they leave the mill.

ELECTRIC SERVICE SUPPLIES CO.

Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA
17th and Cambria Streets

NEW YORK
50 Church St.

CHICAGO
Monadnock Building

Canadian Distributors: Lyman Tube & Supply Co., Ltd., Montreal, Toronto

Putting Pulling Power into the Business Paper

FOR the third time since January an *Electrical World* editor is traveling from New York to California in active co-operation with the National Electric Light Association. Three other *Electrical World* editors have made the trip from the Atlantic to the Pacific in the same period, scouring up and down the states between for facts and figures of essential importance to electrical engineering and commercial interests.

Out of the power plant world a demand, multiplied and insistent, comes for information on oil engines. As a result, a noted authority on Diesel and semi-Diesel engines is added to the editorial staff of *Power*. He is sent out to visit all important installations of these engines throughout the country. Over three months of travel and study will be spent by this *Power* editor solely to gain for *Power* readers a fuller knowledge of oil engines operating performance under all possible service applications and conditions.

A McGRAW-HILL man representing *Engineering & Mining Journal*, after having been forced out of Mexico by warring factions, has again plunged into that turbulent country to learn and report actual conditions affecting mining and oil well operations and prospects and equipment opportunities.

An editor of *Ingenieria Internacional* comes back from a long trip through the countries of South America bringing much valuable data on trade conditions, engineering and industrial development, and equipment requirements.

American Machinist recently sent one of its executives on a tour of Europe to study the metal-working industries abroad for the benefit of similar industries and machine-tool manufacturers at home.

An editor of *Engineering News-Record* also has just returned from Europe, where he has been investigating engineering practice and equipment usage and needs in the construction field.

General departure from rule-of-thumb methods is an urgent need of the chemically controlled industries. To this end *Chemical & Metallurgical Engineering* has made an exhaustive investigation on which is founded one of the most significant and important issues of any publication in the engineering and industrial press—the September 8th "Convention" issue of *Chemical & Metallurgical Engineering*.

Electrification of steam rairoads is a question pregnant with transportation improvement possibilities in this country. So an *Electric Railway Journal* editor recently made an extended trip over the system of the Chicago, Milwaukee & St. Paul R.R. to study this famous achievement in railroad development. Returning east this editor made a sweeping tour of Canada, getting data vitally interesting to American electric railway men and builders of electric railway material on today's methods, equipment, plans and outlook of the foremost Canadian electric railways.

The extraordinary success of *Electrical Merchandising* since its inauguration in 1907 is largely due to the indefatigable field work of the editors. These editors comb the continent with their journeys. They are constantly in personal contact with the electrical dealers, jobbers and contractors. They meet them at their conventions, clubs, clambakes, summer camps, offices, stores, warehouses and homes. They are keeping in touch with movements and materials and markets and methods and men—helping these men individually and through their organization.

Industrial, agricultural and commercial development of the West beyond the Rockies depends in large measure on the development of electricity from water power. To promote the industrial development of these great States with their specialized problem, McGRAW-HILL service to the electrical field was expanded in September, 1919, by the purchase of the *Journal of Electricity*. The acquisition of this publication demonstrates that McGRAW-HILL service, when conditions require, is intensive, as well as comprehensive.

As an editor of *Coal Age* recently wrote, "Read your *Coal Age* closely, and you will see that no stone is being left unturned to make *Coal Age* a mirror of the industry, to make the achievements and experience of some enterprising individual somewhere the pivotal point for an advance of the entire craft."

THIS is the policy that governs ALL McGRAW-HILL publications. It picks the ablest men as editors. It sends them out into the fields served by those publications. It bids them seek the problems of those fields. And through their publications these editors lead and co-ordinate the search for the answer to those problems.

That is the kind of service that puts pulling power into a business publication.

That is why McGRAW-HILL publications are dominant in their fields.

That is why they are read—with care and respect—by the biggest men in those fields.

And that is why they exert the influence on those men that makes advertising in McGRAW-HILL publications productive.

McGraw-Hill Company, Inc., Tenth Avenue at 36th Street, New York

American Machinist
Power
Electric Railway Journal

Electrical World
Journal of Electricity
Electrical Merchandising

Engineering News-Record
Coal Age
Engineering & Mining Journal

Ingenieria Internacional
Chemical & Metallurgical Engineering

Hog Island Shipyard Trains are Pneumatized.

For Real Train Operation

Standardize *Pneumatize*

Here are some of the operators of city *surface* car trains who have installed one or more of the National Pneumatic "Rushour" line to make the use of trains for increasing track capacity 100% effective.

Boston Elevated Railway.
Cincinnati Traction Company.
Capitol Traction Company, Washington.
Cleveland Railway.
Detroit United Railway.
Milwaukee Electric Railway & Light Company.
Montreal Tramways Company.
Peoples Railway, Dayton, Ohio.
Philadelphia Rapid Transit Company.
Toledo Railway & Light Company.
United Railways Company of St. Louis.
United Railways & Electric Company of Baltimore.

And, here are the devices that will do the same for you.

National Pneumatic

Door and Step Control.
Safety Interlocking Door Control.
Motorman's Signal Lights.
Door and Step Operating Mechanism.

Ask us also about National Pneumatic Multiple Unit Door Control! It's the last word in making the rush hour the hour that PAYS.

National Pneumatic Company, Inc.

50 Church St., New York Edison Bldg., Chicago
Works: Rahway, N. J.

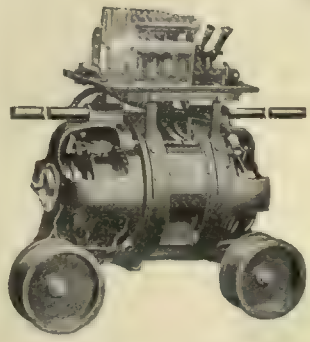
CHAPTER TWENTY-FOUR

THE ALL-*BUT* PERFECT STATE

—*and They'll Get Their Money Fast*

Few people are willing to pay less for an inferior service. Most people gladly pay a lot more money for a little more service.

Capitalizing on this slant of human nature the roads in the All-*But* Perfect State will charge extra fares for extra services. As an example express speed on a run will command excess fares and who is there that will not pay a few cents extra for quick delivery to destination? Human nature is so constituted that a man will break his neck to catch a car even though another car will be along in a few minutes. Speed is the need—whether it be in getting over the track or getting over a bonding job on the track—and that is why in this state the Dynamotor will be standard equipment—purely because of its speed in doing a good bonding or rail welding job.



READING NUMBER TWENTY-FOUR

Q. Isn't time necessary to do an effective job of bonding?

A. Not where the Dynamotor is used. The Lincoln Process which is used with the Dynamotor enables you to put over the best job of bonding in the world without the slightest interference with high speed schedules or the closest of headways.

Rail Welding and Bonding Company

formerly The Lincoln Bonding Co.

RW&B

Cleveland, Ohio.

Save the Seconds

Watch the *duration of your car stops* and you won't have to worry about maintaining schedules.

A few seconds saved on *each* of your cars *every* time they stop to take on passengers soon runs into *hours*. Save these hours and you have the equivalent of *faster schedules* on *one or more cars in service.*

Delay in taking on passengers is occasioned to a great extent by confusion in handling fares. This is especially true when an odd cent fare is in effect.

By giving your conductors a means of handling the multiple unit fare with all the ease and precision obtained with the single coin fare, not only are schedules speeded up, by improved service and a better satisfied public is the logical outcome.

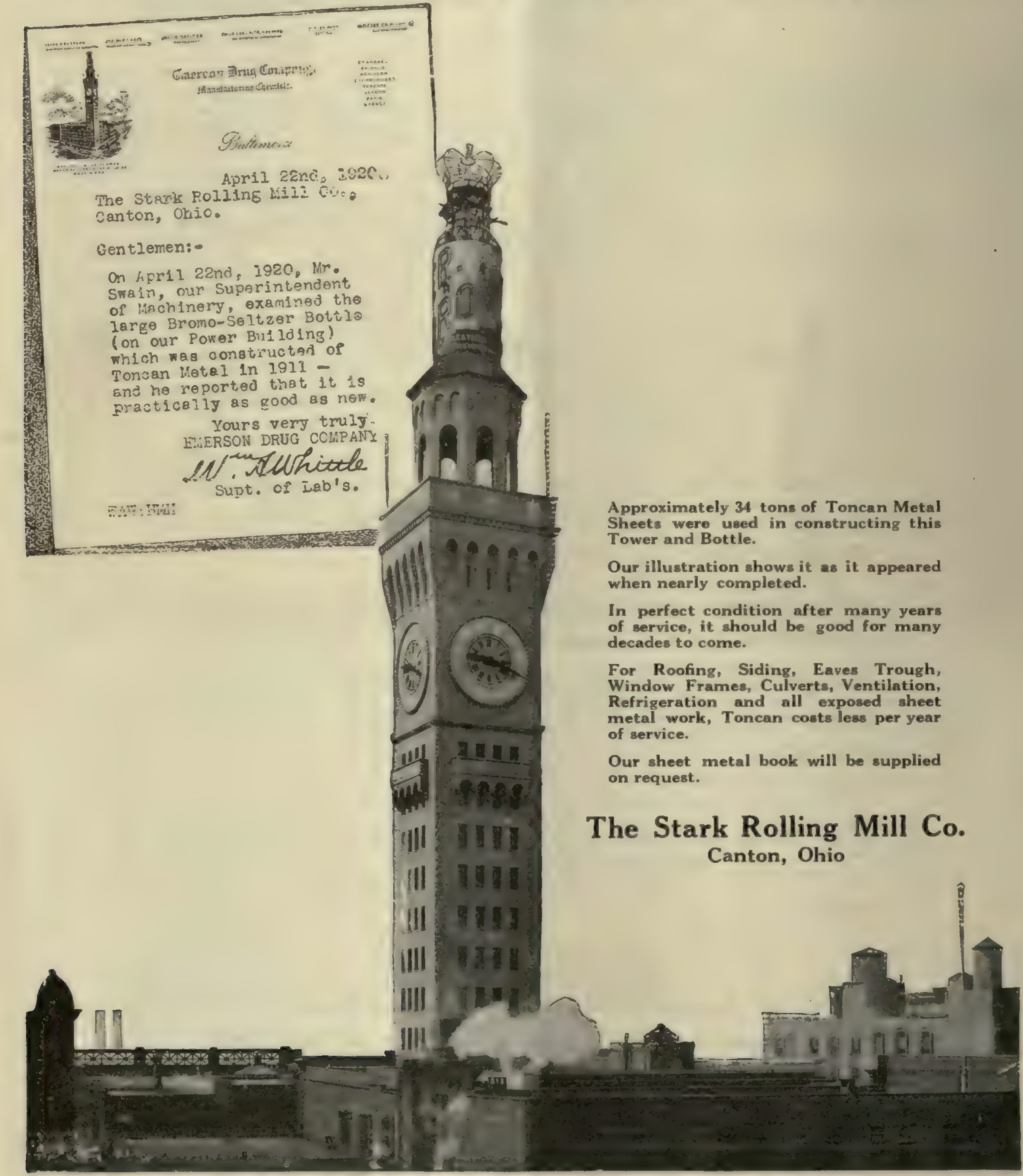
To obtain this result it is only necessary to install Johnson Fare Boxes and Johnson Metal Tokens. They are speeding up service on more than 200 of the country's electric railways.

If you're interested in better fare collection and increased revenue, write today for all the facts.

JOHNSON FARE BOX COMPANY

Ravenswood, Chicago, Ill.

Toncan Metal is "Practically as Good as New" After Nine Years' Service



Emerson Drug Company,
Manufacturing Chemists.

Baltimore

April 22nd, 1920.

The Stark Rolling Mill Co.,
Canton, Ohio.

Gentlemen:-

On April 22nd, 1920, Mr. Swain, our Superintendent of Machinery, examined the large Bromo-Seltzer Bottle (on our Power Building) which was constructed of Toncan Metal in 1911 — and he reported that it is practically as good as new.

Yours very truly.
EMERSON DRUG COMPANY
Wm. A. Whittle
Supt. of Lab's.

EAW:HMI

Approximately 34 tons of Toncan Metal Sheets were used in constructing this Tower and Bottle.

Our illustration shows it as it appeared when nearly completed.

In perfect condition after many years of service, it should be good for many decades to come.

For Roofing, Siding, Eaves Trough, Window Frames, Culverts, Ventilation, Refrigeration and all exposed sheet metal work, Toncan costs less per year of service.

Our sheet metal book will be supplied on request.

The Stark Rolling Mill Co.
Canton, Ohio

If You're Building for Permanence Use TONCAN METAL Lasting. Economical. Satisfactory-USERS KNOW

THERE is no single factor contributing to operating efficiency that is of more importance than correct lubrication. Tie-ups, repairs and withdrawal of equipment are expensive propositions and may be traced so often to improper lubrication that to take chances with ordinary oils is simply inviting trouble.

Galena Service provides first, the reliable Galena Quality lubricants—the best that can be made; second, the personal services of lubrication experts, who install and put in operation the scientific methods perfected by this company. The close, constant supervision and co-operation of these experts insures an economical and satisfactory service that is proving its value on the greatest railroad and traction lines in the world.

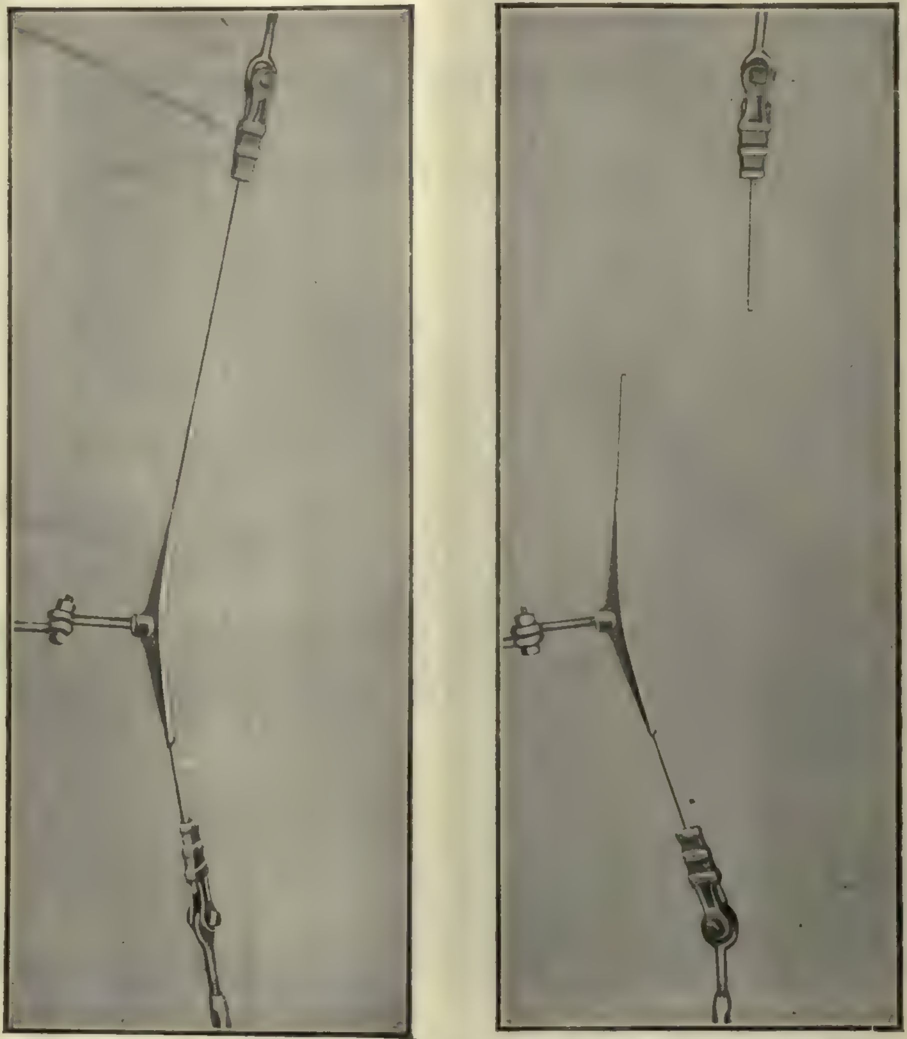
The records of hundreds of competitive tests show that Galena Oils and Galena Service are an invaluable aid in bettering operating conditions and that the savings effected through their exceptional ability is a decided factor in reducing operating costs.

Galena-Signal Oil Company

New York *Franklin, Pa.* *Chicago*

and all principal American cities

LONDON TORONTO BUENOS AIRES MONTREAL PARIS



THE HEAVY STRAIN BENDS THE EAR AND FINALLY BREAKS THE WIRE
BUT THE EAR DOES NOT LET GO

G-E Composition Metal Clinch Ears

Milled slot ears are better than rough finished ears because the smooth slot gives more bearing surface on the wire which means greater friction and, therefore, greater holding power.

HERE IS THE PROOF

A G-E ear, selected at random from stock, was clinched on a brand new piece of 3/0 trolley wire. The wire was then clamped in a pulling machine and the ear subjected to strain until the wire broke. There was absolutely no sign of the ear's loosening its hold on the wire.

G-E Clinch Ears will hold any strain up to the breaking point of the wire. They are made for round and grooved wire.

Order them from stock.

General Electric Company

General Office
Schenectady, N.Y.

Sales Offices in
all large cities

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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HARRY L. BROWN, Western Editor N. A. BOWERS, Pacific Coast Editor H. S. KNOWLTON, New England Editor C. W. SQUIER, Associate Editor C. W. STOCKS, Associate Editor
DONALD F. HINE, Editorial Representative GEORGE BUSHFIELD, Editorial Representative G. J. MACMURRAY, News Editor W. R. ANDERSON, Assistant News Editor

Volume 56 New York, Saturday, October 23, 1920 *Number* 17

Sell More Transportation on Its Quality

WE HEARD an official of an automobile manufacturing company say the other day that he never went to his office in his auto in the morning, "for," he said, "I think too much of my morning newspaper; I go on the street car." Here is a man who enjoys his breakfast with his wife and family without a newspaper barricade to separate them and then takes advantage of one of the good features of street car riding to learn the morning's news. It's an old story to electric railway men, but how much are we doing to tell such stories to the public to whom we want to sell our rides? Why not sell more goods on their quality?

If a grocer or other local merchant wants to maintain his trade in the face of new competition, mail order inroads and of individuals supplying their own needs in various ways, he brushes up his wares and tells the public why he is still prepared to give them the best service and what the good qualities of his wares are.

Of course, we admit your rejoinder that the electric railway is a public utility and on a different basis. But there are many features of other businesses which can well be put to greater use in the electric railway business, and selling rides on quality is one of them. The little newspaper story above is an example of one advantage of electric railway rides which cannot be enjoyed in the average jitney or motor bus or private automobile.

The Significance of Electrification

LAST June the JOURNAL published an article by E. G. Buckland, vice-president of the New York, New Haven & Hartford Railroad, under the above title. This week we publish abstracts of some of the principal addresses scheduled to be presented at the joint meeting of Mechanical and Electrical Engineers in New York on Friday, Oct. 22, as announced in detail last week. It is both interesting and instructive to note that in the article by the railroad executive and in the papers by mechanical and electrical engineers the leading theme is not the mechanism which is to be used to haul trains or produce train-miles so much as it is the comparative effectiveness of the service to be performed by the two agencies. What the public is interested in, and therefore what the railroads are interested in providing, is transportation service. Broadly considered, the public is interested in coal conservation as such, but most concretely is the public interested in the transportation service rendered and the cost of the service. As pointed out by Mr. Buckland, the terminal advantages in large cities are a part of both the service rendered and of economy.

But here, with engineers discussing the steam versus the electric locomotive, while each advocate of his own agency is proud of and dwells upon the efficiency and power consumption, the weights, the tracking qualities, the speeds, etc., they all rest their case and their own decision on the service ultimately rendered by the entire system. That the electric locomotive as such has reached a stage of most practical development is not disputed. That the steam locomotive has increased its dependability and efficiency and is, as a machine, almost perfection is also evident, and this fact should be recognized by the proponents of its electric rival. But certainly, under many modern transportation conditions, the electric locomotive shows a necessary field for itself in which the steam locomotive is already a hopeless competitor, and must soon be displaced entirely. As a result of the consideration of this subject in the joint meetings there should be developed a much clearer conception of the fields of the two systems under present conditions and also what factors will determine, under future conditions, when the electric locomotive is to displace the steam.

An Idea, and a Personality

THOSE who were fortunate enough to hear Martin Schreiber, chief engineer of the Public Service Railway of New Jersey and manager of its Southern Division, give his address on training electric railway personnel at Atlantic City could not help catching the enthusiasm of the speaker for his subject and his evident desire and ability to put his ideas into practice. The JOURNAL is printing an extended abstract of his address this week, but printed words are somewhat dead. Some will say, as some have said, that these ideas are not new, that they, the speakers, have been practicing along such lines for some time. Maybe so—maybe they think so, at least, but mere plans or ideas are one thing and success in using them is another.

The industry is always on the hunt for new ways of solving problems, but it cannot guarantee that a method successful in one place will make good somewhere else. As regards mechanical matters, such as the babbitting of a bearing, a strict following of the procedure of the successful pioneer is likely to be successful. Unfortunately this is not true where the human element is involved. One railway achieves a commendable result with a wage or a merit or a co-operative system, but another, hastening to adopt it, fails to attain similar success. The practice of both railways being alike in all externals and the human nature of the employees being much the same everywhere, shall we not look for the answer in the personalities of the different managers and their aides?

The successful man succeeded only because he believed in his plan so thoroughly that he made all his staff believe in it, too, so that they in turn carried the message to the rank and file. It succeeded because everybody soon learned that the Boss meant just what he said and would not be turned from his purpose. The plan did not succeed on the second property because the manager gave a smoker to the boys, made a sympathetic address and then left the working out to a lot of "unsold" petty officials.

In other words what is needed for accomplishment is an idea *plus* a personality, a plan coupled with the enthusiasm and ability to put the plan into operation.

No one can have heard Mr. Schreiber without being convinced that he has both these attributes. He also has, clearly formulated, the constructive ideas with reference to railway personnel which should do much to maintain an effective organization with the necessary co-operation between men and management, all of which is needed for the successful operation of a railway property. He makes no claim that these are all new and admits that he learned much of what he now sets forth from the present Lord Ashfield. Certainly every one hopes that Mr. Schreiber will have the fullest opportunity to put these ideas into effective practice at Camden. But, more, it is to be hoped that others in a position to profit by them will see in his ideas and plans suggestions which they can apply, coupled with their own personalities. The industry needs more of such ideas and men.

The Call for Increased Effort All Along the Line

RENEWED energy and a determination to work out their problems to a successful issue should be one of the results of the Atlantic City convention. No one could have attended the meetings there without being strongly impressed with the essential nature of the industry and the solidity of its future. Hard work will be required to solve all the problems, but hard work is no deterrent to a man of courage where there is hope of ultimate success, and in the railway industry there is not only hope now, but the final triumph is practically in sight.

The same resolution to do better work should extend all along the line in every railway organization. In fact, efforts toward higher efficiency and greater production are the order of the day in all industries in this country, and the electric railway field should be no exception. During the war the fall in manufacturing output per man employed was a common complaint, but there were many reasons to account for the demoralization and high turnover which characterized the operating forces of that time. Many employers declared that they could afford the higher wages which they had to pay if only labor would increase its rate of production.

Now the desired increase in efficiency seems to be evident. In a recent inquiry made by the Federal Reserve Bank in New York of thirty-one of the largest corporations in the country, all except nine report improvements in this regard. None of the concerns reported any decrease in efficiency, five reported that there was no change one way or the other and four were unable to draw conclusions from any data at hand. Others quote definite increases, such as one of the large steel corporations quoting 6 per cent, two clothing factories 7 to 8 per cent and other large concerns from 10 to 17 per cent as compared with a year ago. With these figures the turnover of employees is said to be decidedly less than formerly, and more men are looking for work.

Such an increase in efficiency will be one solution and the most satisfactory all-around solution for the present high wages paid to electric railway employees. For example, if the shop man will do more work in the same time he may extend the period during which the company is warranted in paying war wages in spite of reduced living costs. If the motorman can operate his car so carefully and skillfully as to warrant the management in increasing the schedule speed of the road and if the conductor will co-operate in this effort and stimulate traffic by merchandising methods they will justify the increases which they have received during the past five years.

This is a time when all departments should make a special effort to pull together. There is every reason and every inspiration for such a movement now. Let this be the spirit to animate the entire organization of every electric railway company during the coming year.

Making the Interurban a "Real Railroad"

A CENTRAL station manager, unversed in electric railway matters, was recently invited by the writer to return to Chicago from Milwaukee by way of the North Shore Line instead of the steam road. With some hesitancy at the thought of a 100-mile interurban ride, he was finally persuaded. On the way down, while enjoying an excellent dinner in the dining car, the last of a four-car train, and traveling at 80 miles per hour, he exclaimed: "Why, this isn't an interurban! This is a steam road, but run by electricity."

And so it is. Great things have been done to make the North Shore Line a "real railroad," and it may now be said that it is one of the leading show lines of the country in general physical condition, equipment, service rendered and morale of employees. Its earnings are also satisfactory and improving rapidly, and the people along the line are actually talking about it and boosting it to their friends. This did not happen by chance. It has come from a lot of hard work and the practicing of the principles which were set forth in an article in the Oct. 2 issue by Britton I. Budd. It means that a very unfavorable public reaction toward the road only a few years back has been turned into indorsement through the pursuit of a single purpose—to give good service, with all that that embodies.

The courtesy of the trainmen and their open interest in the road and the punctuality, speed and comfort of the service are things that impress one as he makes a trip over the line. Indeed, it is an inspiration to any one interested in the electric railway industry to take this trip to Milwaukee and return from Chicago over this electric railroad constructed and operated according to heavy traction practice.

The article by Mr. Budd referred to contains numerous suggestions about operating practices that will develop interurban lines into popular railroads. As written, it gives only the meat of a wealth of experience, omitting all the background or substantiating evidence for the conclusions drawn. Yet we know that none of these conclusions is without the backing of proved practice. While Mr. Budd doesn't say so, out of modesty in his accomplishments, all of the things recommended in his article have been done on the line which he directs, and that is why we are glad to give this special emphasis to his contribution solicited for the convention issue.

Way Standards Adopted Last Week an Important Step

ONE of the most far-reaching acts taken by any of the associations last week at Atlantic City was the acceptance by the Engineering Association, among the other recommendations made by the way committee, of its proposed uniform track spirals and curved heads for girder grooved rails. Both of these subjects have been treated extensively in this paper in the past, and action along these lines taken by the Engineering Association last week has been urged in editorials published in previous issues of this paper.

The adoption of a uniform system of track spirals should lead to many economies in the manufacture and maintenance of special trackwork, and the spiral system as presented by the way committee has the advantages of simplicity and adaptability for use in connection with partial renewals. The report emphasized the latter by illustrating the method of adapting the new spiral system to the renewal of a part of an old layout. We feel that the committee is to be congratulated upon its successful efforts to reconcile differences of opinion in regard to this subject which have so long prevailed among manufacturers and railway men. Having adopted the uniform spiral, it now remains for the engineers to see that its use is put into effect as promptly as possible.

The incorporation of a curved head or tread contour upon the standard girder grooved rails is another step in advance which should have a far-reaching effect in securing maintenance economies. The report of the committee treated the subject from every angle, and it will be noted that the committee recommended the adoption of designs for which rolls have already been provided. Meanwhile, it was unnecessary to change any other dimensions of the existing standard girder grooved rails.

The substitution of designs for standard section rails which have a greater demand than those now in the Engineering Manual is another step which is to be commended, and the committee has shown businesslike acumen in recommending the adoption of sections which may be obtained readily from the mills. The advantage of having manufacturers represented upon the committee is clearly shown in the treatment of this subject by the committee.

The committee reported upon an important subject in its discussion of the so-called impression test for girder rails. In line with comments which we have heretofore made, the committee expressed the belief that the impression test does not properly provide a test for brittleness and recommended further investigation with the view of developing some adequate test for brittleness which can be made as readily as the impression test. The matter is important, and we are pleased to note that the committee is alive to that fact. It is to be hoped that this year's committee, in co-operation with the manufacturers, can devise a test which will meet the requirements.

In recommending the new subject of the use of substitute ties, the committee recognizes the fact that such ties are being used to an increasing extent, and we are of the opinion that the 1921 way committee can lead the way in developing information as to the value of existing designs and at the same time it may consider the matter of the design of such ties as engineering structures. There seems to be a distinct field for substitute ties in street railway tracks and the introduction of the subject is considered very timely.

For those who think that the life of railway physical property is readily determined, we recommend the study of the monograph by Victor Angerer attached to the report as Appendix H. Mr. Angerer gives an able exposition of the many variables which prevent the compilation of data which have any value and covering the life or limits of wear in special trackwork. The committee is fortunate in being able to present such an able treatment of a very difficult subject.

The thoroughness with which the report as a whole was compiled attracted much favorable comment both on the floor at the convention and on the side. In fact, and without any disparagement of any of the many other excellent reports presented at Atlantic City, it is proper to say that this report is a good example of what a convention report should be.

Philadelphia Goes to Seven Cents

ONE cannot avoid recognizing that the industry will attach more than ordinary importance to the latest fare change in Philadelphia, reported in the news columns of this issue. Philadelphia is the one large city in which a private electric railway management has acted on the policy of trying to maintain 5 cents as the initial unit fare. Because the management, under the conditions obtaining in Philadelphia, has been able to retain the 5-cent base for so long and has preached the policy as a good one elsewhere, there has been criticism from other managements which have had Philadelphia "flung in their faces" by their own communities when seeking fare advances to meet ever increasing costs.

Now that Philadelphia is to have a 7-cent fare, with reduced-fare tickets and a continuation of 3-cent exchange tickets, it is only fair that a correct interpretation be placed upon this move. As facts appear, the management, that is, largely, Mr. Mitten, has not abandoned the idea that the retention of the 5-cent minimum fare is still the best policy. The company asked for a 5-cent fare with no transfers whatsoever in the belief that the advantages of the 5-cent fare to the average rider and in attracting the short-haul passenger more than offset the disadvantages to the patron who has to use more than one car. There was no avoiding the fact that in Philadelphia, as elsewhere, costs of operation have risen. When the case came before the Public Service Commission, however, that body differed with the management and decided that with the traffic flow and conditions such as they are the retention of transfer privileges, even with a charge at some points, was more important than the retention of the 5-cent base fare. The arrangement is a temporary one, pending valuation and a final fare adjustment, and of course and rightly, when the final fare system is devised the voice of the management will probably have much influence in connection with the adoption of a permanent system.

What is apparent in the entire case, however, is that electric railway operating costs have gone up and income must go up in proportion. The question in Philadelphia has been as to the best way to increase the income. This has been decided by the Public Service Commission of Pennsylvania to be, for at least the present, a flat increase in the existing fare.

Training of Electric Railway Personnel*

General Principles to Be Followed in Dividing and Deputizing Executive Duties—Application of These Principles on Public Service Railway Property at Camden, N. J.

BY MARTIN SCHREIBER
Chief Engineer Public Service Railway and Manager
Southern Division, Camden, N. J.

MARTIN SCHREIBER

BEFORE taking up the main line of thought which I wish to lay before the delegates to the Atlantic City convention of the American Electric Railway Association, I wish to tell a story which illustrates the principles to be stated afterward. I live in East Orange, N. J., and to the right and left of me live neighbors each blessed, among other good fortunes, with a fine son of athletic tendencies. My right-hand neighbor wished to break his son of over-devotion to athletics and began by assigning for a certain Saturday the task of cutting the grass on the lawn. The purpose of this was to keep him off the baseball field on that day. The boy went to the field and explained the circumstances to his comrades, telling them not to wait for him after a certain hour. The task had been so planned by the father that it was out of the question for the boy to play, and he lost his game. Incidentally the team failed to win the game.

My left-hand neighbor tried somewhat the same tactics but with a different result. His son had the job of cleaning up the leaves, but instead of spending the time raking he brought his football team over to the yard and hurried the job through before the game was called. He explained to his father afterward that even if this had not been possible he had arranged for a substitute.

I tell this story because it seems to me that the second boy showed attributes which are necessary in any individual who is to carry executive responsibility. He did the task assigned to him, but he secured the co-operation of others and they were glad to co-operate with him because it was to their interest to do so. Take another illustration, from the experience of E. H. Harriman. When he reorganized the Southern Pacific it was his ambition to build up the greatest of transportation systems. For this purpose he sought out men who had the power of reflection, of initiative and of growth. He had difficulty in locating such a personnel, but afterward said that he could find in the subsidiary offices of the various companies that had been consolidated many men who were human machines but few that were any more. The story is told of him that, when seeking out people for his organization, he would go through the various offices and when he found a man surrounded with books and papers, too busy to notice what was going on, he would not stop; but when he found a man in a reasonably well-conducted office, apparently in thought, perhaps with his feet on the table, he was sure to give that man most serious consideration.

Why is it difficult to find the ideal supervising employee? Simply because industry has not developed him. We have spent millions of dollars and much time in developing specifications for material, but little money or time in developing men. Lord Ashfield, or Albert Stanley as we knew him here, is considered one of the biggest transportation men of our time. At fifteen he was working as a switch-boy in the streets of Detroit; at twenty-five he was superintendent of the Detroit United Railway; at twenty-nine he was general superintendent of the Public Service Railway; at thirty-three he was manager and director of the London Underground Lines. Today, Mr. Stanley, barely forty-six years of age, is not only chairman of the board and managing director of the underground lines of London, but is a member of the British House of Lords. In a recent interview published in *System*, he says that "the secret of how to find big men, who I am sure are growing up to fill the big new jobs of the new century, is opportunity, opportunity and again opportunity; opportunity must be thrown at them—opportunity to educate and train themselves." From my observation, there are many officials in industry, including those in the electric railway business, who are engaged in suppressing the powers of reflection, of initiative and of growth in employees. Moreover, many officials think that before a man can become an executive, with responsibilities involving several departments, it is necessary for him to have a long specialized training in each department. By applying ordinary arithmetic it can be seen that following this procedure a man would have to be as old as Methuselah before he gets the executive job. By this time he is so old that he has lost all his enthusiasm.

The truth is that when a man has shown ability to excel in handling one department of the electric railway this is a good sign that he could be an executive for several departments. At least he should be in line for such opportunity. It is not necessary to maintain a man in an executive position because he has been tried out in it, but if a company never tries a man out it will never have available competent men to fill the bigger jobs. Some of us seem to forget that we who have been placed in executive positions had, ourselves, to begin at one time.

LEAVES FROM DAVISON'S EXPERIENCE

H. P. Davison, of the great banking house of J. P. Morgan & Company, was asked what plans and methods he had followed in accomplishing the large undertakings he performed in connection with his firm. His reply was: "If I had any definite plan, the first was I would try and do my job and the work assigned to me a little better than any one else; second, I always groomed some one else for my job; third, I always studied and trained myself for the duties of the man in the position above me." These are very simple declarations, but they carry with them principles of tremendous importance. How many railways are there that have men groomed and ready to step into any of the supervisory positions in case of vacancies. No doubt in a large percentage of the companies if the manager or a department head or two should drop out there would be something of a panic in the "front office." Now, this should not be the case, but rather the reverse. If the manager or any of the department heads or any man in the employ of the company should leave, this ought to give the other fellows a chance and thereby introduce new blood and enthusiasm into the organization.

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*Abstract of paper read at annual convention of American Electric Railway Association, Atlantic City, N. J., Oct. 13, 1920.

An organization that is stagnant and without enthusiasm is defeated at the outset; the whole organization gets into a rut and the men are, more or less, the machines that Mr. Harriman found. Certainly an unenthusiastic organization will never accomplish what Mr. Davison set out to do, to give service a little better than the other fellow. Emerson said in effect that if you manufacture only a mousetrap and make it better than any one else, even though you have a house in the woods, you will always have a trodden path leading to your door.

THE "SERVICE COMMITTEE" IS PROMISING

One of the bugaboos in connection with the railway organization is the securing of teamwork or proper co-ordination. There is much overlap of departments and a tendency for one department to shift responsibility on another. Besides, even where there is loyalty, criticism of the management is often heard. One of the best ways to overcome this difficulty is to insist that the department head take an active part in the management.

On the southern division of the Public Service Railway, at Camden, N. J., we are trying out a new organization plan. Every Friday all department heads gather to lay out the operating policies and work of the railway for the ensuing week. They discuss all questions man-fashion. When anything is decided, every member of this "Service Committee," as it is called, is back of the decision and he is responsible for the outcome. The department heads not only carry out instructions given them, but they help to make the orders. This develops the traits that Mr. Harriman was looking for to run his great transportation system.

RESPONSIBILITY OF DEPARTMENT HEADS

We also insist that every department head be a "real boss" as far as his department is concerned, and he is strictly responsible for the work coming under his jurisdiction. At the same time he thoroughly understands that as a whole the railway is more important than any one department. Besides, he is expected to break in a man under him to assume his position in case of necessity. His cardinal duties are to do his job as well as he can, to train a subordinate to fill his position and to study for advancement. For example, it is up to the manager to "groom" department heads for the position of manager; to the superintendent of equipment to train an assistant for his job, and so on down the line. The ultimate goal of this committee is to produce the best service we can and to sell it to the public. We want the public to be a willing and pleased purchaser. We hope to have our business relations with our patrons exactly on the same basis as those of the high-class department stores with their patrons. In the last analysis the public must be the final judge of what constitutes a satisfactory service.

PASSING SERVICE DOWN THE LINE

Now the service committee idea is not going to stop at department heads. Each department head is going to inject it into his own department. We believe that this system will produce a different grade of employee from that which we have at present and put a personal touch into transportation business that cannot be had in any other way. For instance, the operating department will be run largely by consultations of the superintendent of transportation, the assistant superintendents, the road officers, the inspectors, the carhouse men and so on. Their meetings will be so arranged that the ordinary routine of business will not be interfered with and all the men that have any supervising work, that is those who have charge of other men, will have an opportunity to take part in these consultations at least once a month. We expect to go further. One of the inspectors on each line will be responsible for that line and he will know its daily receipts and costs. Few facts will be withheld from him and his business will be to make suggestions for improving the service and pleasing the public as well as to do his daily routine work. We shall expect this inspector or road officer to consult with other inspectors, if there are any others on the line, and also to discuss the run receipts and costs with the particular crews involved, seeking from them new ideas for bettering the service and pleasing the patrons. In doing this we shall be developing those important qualities that every employee possesses to greater or less degree and that will keep the enthusiasm of the organization keyed up to the highest pitch. Besides we are selling our service first to the employees before we sell it to the public.

ANOTHER COMPANY SECTION TO BE FORMED

Besides the official education and development of the men which I have described, we propose to institute another company section of the American Electric Railway Association at Camden. Some semi-official organization seems necessary for the rank and file of the organizations, in the meetings of which the entire railway situation can be discussed in open forum. The position of the electric railway business requires that the most accurate and complete information be given to the public in order to secure co-operation between the car riders and the company. Public opinion of the railway in a general way is obtained by the public through contact with the company's employees. Besides this local consideration, the company section has the advantage on account of its affiliation with the national association. Thus the employees secure an idea of what is going on on properties other than the one with which they are identified. Often the employees' attention may be called to some improvement of practice elsewhere, which by slight modification can be adapted to conditions on the local property.

The company section has many other advantages that have been brought out frequently. It has always been a conundrum to me why the usual electric railway manager has not taken more interest in the company section. I have argued with electric railway officials who cannot see where they are going to get back the money, time and energy that would be required to institute and maintain a section. Almost in the next breath they would complain of poor public relations. How a railway expects to improve public relations without beginning at home and talking to its own men about proper public relations and the real facts about the railway is beyond my comprehension.

THE "RANK AND FILE" OF THE ORGANIZATION

The attitude of the company and its supervisory officials toward the rank and file is one of the most important problems with which we have had to deal. This body of men today is not what it was even five years ago. The requirements of the men are becoming more and more complex. The other day I saw a poster of the United States Army recruiting service. The poster said: "Get a free education; select any one of six countries; select any one of fourteen branches." Many believe that all the men want is more money; this may appear so on the surface, but I do not believe it. Of course, we should pay a living and a reasonable wage, based on what is being paid in like industries elsewhere, but modified to suit local conditions. Our greatest difficulty lies in the fact that many officials entrusted with the charge of men are unfitted for the job.

I believe that proper negotiations with men must in the final analysis be based on one and only one rule, the Golden Rule or the fair deal. To the employer I would say that you will seldom if ever make a mistake in handling a man if you will make an earnest and conscientious effort to find out all the particulars in his case and then put yourself in his place before you make a decision. If you find a dissatisfied man in your organization, do not turn your back on him. Call him in and endeavor to find out the trouble. Probably a personal matter has discouraged the man; in that case try to make a constructive suggestion. The employee may be dissatisfied with his job. Then it is your duty to try and get him other work, maybe in another department. If he is dissatisfied with his pay try to get him more money. This does not necessarily mean an increase in the rate but it may be possible to place him in different work where he will receive more remuneration. It may be necessary to suggest that he do some overtime work, or work on the outside, or again you may have to send him to one of your friends. Do not be afraid to make it a practice to say to every man leaving the service of the company who has not been dishonorably discharged, "If you ever want to come back, we will be glad to do everything we can to place you," for remember that man, even if he is not an employee of the company, may still be a patron of its lines.

True, you may not be able to get a man any more money, but you will find that he has appreciated your efforts and he will make a better and more loyal employee. One of the greatest compliments I ever knew one man to pay another was that of a crook working in a construction gang while I was in Paterson, N. J. After the crook had robbed all of his fellow employees he was apprehended by the police. He admitted he had robbed nearly every one except a certain foreman. That particular foreman, he claimed, he could have robbed many times, but he was the only one in the railway, in his opinion, who had given him, a stranger in a strange land, a square deal when he most needed it. He said he had worked harder for that foreman than he ever worked in his life and he never would regret it and would have starved rather than take a single cent from him.

CHARLES M. SCHWAB IS A REAL LEADER

One afternoon during the war I had occasion to visit the Submarine Boat Company in Newark, about the time Charles M. Schwab took charge of the Emergency Fleet Corporation. He came into the yard that afternoon and the first thing he did was to remove his coat and roll up his sleeves. He took one of the workmen by the arm and walked up to the platform with him. It just took about a minute for a person to realize that Mr. Schwab was a real leader. He spoke briefly to the men and when he finished there was tremendous applause from the brawny-armed workmen, with nods and smiles of approval from the officers of the boat company. It was evident that they were for him to a man; in short, he had won their confidence.

AN OFFICER OF PERSONNEL

In connection with the Camden organization, we propose to have one man in our organization who will be in charge of employment. He will hire every man who will be required to run the railway, in no matter what department. Before the employee is passed along for instruction or investigation, this superintendent of employment will interview him.

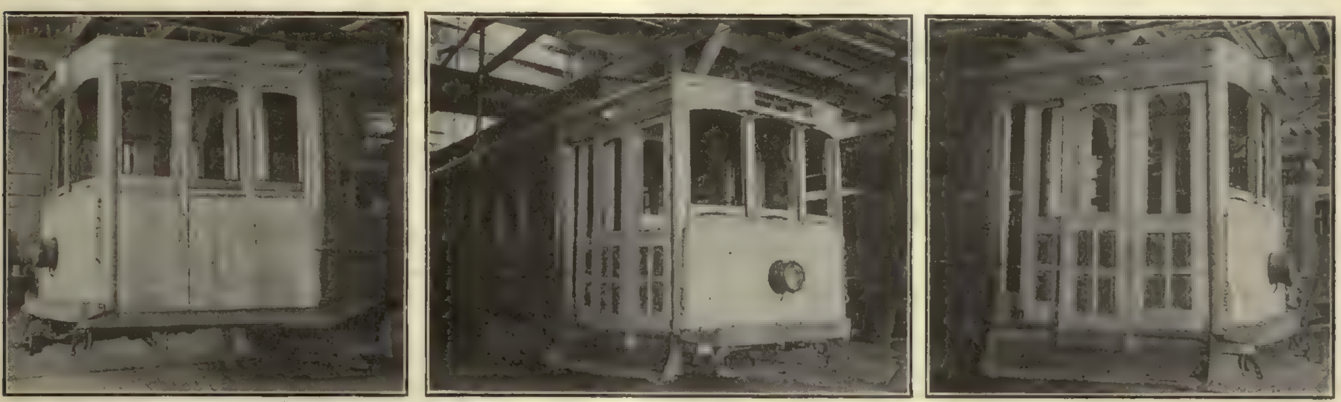
Many employees are ruined when first they apply for work. The first impression that the new man gets of the company is of great importance. The very fact that he is looking for a job indicates that he is not in the best kind of circumstances, hence a sympathetic attitude on the part of the company officials at that time may reach him and may win his favor and loyalty forever. On the other hand, a too critical attitude on the part of the company's representative, which, I fear, is not unusual, may cut him deeply. He accepts employment because of necessity for work.

It will be the business of our superintendent of employment not only to hire, train and follow the employee from the production standpoint, but it will also be his duty to keep in touch with him from a personal standpoint through his career with the company.

Welding Experts Active

THE American Welding Society is doing very effective work through its sectional and general activities. The Chicago section, for example, has just issued a booklet entitled "Keep the Guesswork Out of Welding." Copies of this may be had by addressing the American Welding Society, 608 South Dearborn Street, Chicago, Ill.

The society announces that members of the welding trade in Cleveland are making arrangements to form a section in that city. A meeting to consider the organization of a New York section was held in the Engineering Societies' Building, New York City, on Oct. 14. At this meeting it was decided to organize a New York or metropolitan section, and a nominating committee, a rules committee and a committee on membership and organization were appointed. The next meeting for the formation of this section will be held on Monday, Oct. 25, at 4 p.m.. Every one interested in the various processes of welding is urged to attend.



FRONT VESTIBULE OF CAR RECONSTRUCTED FOR ONE-MAN OPERATION IN SHOPS OF WASHINGTON WATER POWER COMPANY, SPOKANE, WASH.

Shop and Park Notes from Spokane

Washington Water Power Company Operates One-Man Double-Truck Cars Successfully—Also Has Natatorium Park, Which Is One of the Few Parks in the Country That Pays

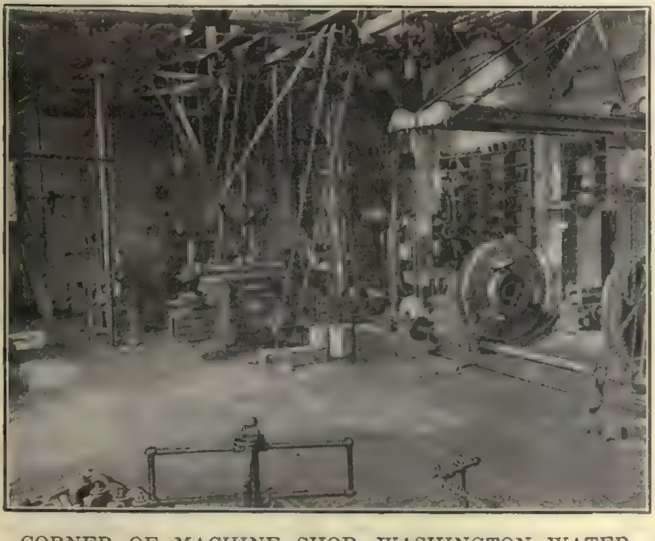
SPOKANE, WASH. (pronounced Spo-kan', if you please), is a city well supplied with urban and suburban transportation facilities. The larger part of the urban service is furnished by the Washington Water Power Company, while most of the outlying lines belong to the Spokane & Eastern Railway & Power Company. The latter is part of the "Inland Empire System," which will be discussed in another article. The writer recently had an opportunity to look over the Water Power Company's lines in company with R. A. Willson, general superintendent, and in doing so noted a number of points of interest.

Although the city fare in Spokane is limited to 6 cents, which is entirely inadequate, both of the companies are keeping up an excellent schedule. By the use of one-man cars, rigid economy all along the line, ingenious shop methods, etc., they are able to keep their heads above water. To be sure the Inland Empire has recently passed through a receivership, but as Kipling says, "that is another story."

The logic of the local situation demands a unified system for the city lines, and as the larger of the two companies, as far as city mileage and cars are concerned, the Water Power Company will presumably operate it. Plans to this end have been under way for years (see ELECTRIC RAILWAY JOURNAL, April 26, 1919, page 839), and are still under way. The proposed merger involves many financial and physical difficulties, but these are gradually being overcome. The recent reorganization of the Inland Empire System has made a new plan necessary.

There is a strong local tendency in Spokane to standardization of equipment and methods and the managements show a spirit of active co-operation. For example, at present the Water Power Company is remodeling in its shops a part of the rolling-stock of the Spokane & Eastern, changing over double-truck cars for one-man operation.

The Water Power Company has about 111 miles of single-track, 142 motor passenger cars, ten passenger trailers, three express motor cars, twelve freight and eleven other cars. As the nature of the equipment



CORNER OF MACHINE SHOP, WASHINGTON WATER POWER COMPANY
Note floor paved with sawed-off sections of wood poles.

RE-SAW ATTACHMENT FOR BAND SAW USED IN WOOD MILL OF WASHINGTON WATER POWER COMPANY indicates, its business is radically different from that of its neighbor. It has an excellent shop, in which, as mentioned above, it is remodeling a number of city cars for the other company. These cars, like those remodeled by the power company for its own lines, are double-truck cars which have been turned end for end, the principal work being the substitution of new front vestibules for the old ones. Several pictures have been reproduced to show the details of this reconstruction.

HOW EQUIPMENT MAINTENANCE COST IS KEPT DOWN

In the company's shops particular attention has been paid to the equipment required for economical maintenance. The machine tool equipment in the company's machine shop is of particular interest. A part of this is shown in an illustration. The several tools are served by means of small gib cranes mounted on pipe standards, so that there is little manual labor required in handling the work. The floor of this shop, by the way, is paved with blocks made by sawing up old transmission line poles. While not as smooth as a floor made of regulation creosoted wood paving blocks, this floor answers its purpose and is very durable.

Another illustration shows a "resaw" attachment to a band saw which has proved to be a wonderfully useful tool. It consists of a set of rolls surrounding the saw and driven by gearing. The rolls are readily adjustable for different thicknesses of material to be split and the tool has been found invaluable during the car-remodeling régime, which still continues.

LEST WE FORGET NATATORIUM PARK

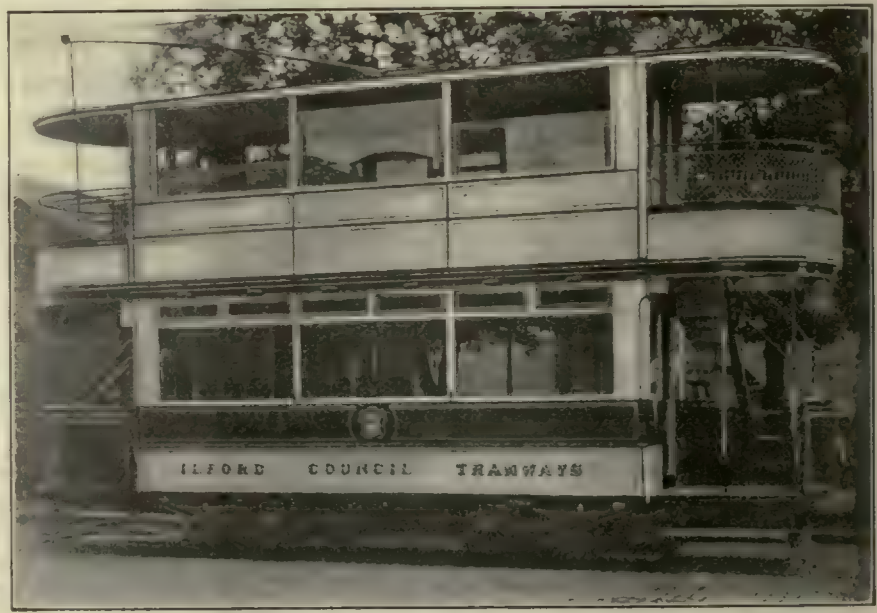
The Washington Water Power Company is one of the few in the country that is making a park pay. Circumstances are such locally that the public depends largely upon the company's Natatorium Park for its diversion. The park is conducted upon the principle that the numerous amusement features must each bring in a satisfactory return. They are operated either by the railway department or by concessionnaires, depending upon the character of the feature. For example, the company operates the "shoot the chutes," the flying swing (the cars of which are provided with motor-driven propellers to simulate airplanes), the natatorium, the dance hall, etc. It lets out the roller coaster concession (the coaster, a new one, being one of the largest in the country), the refreshment sale privilege and some others.

The piece of woodland in which the park is located is in itself a thing of beauty and the company has enhanced its attractiveness by judicious planting. A state fish hatchery is no small attraction in itself. Mr. Willson takes a personal interest in the details of Natatorium Park and spends much of his spare time therein.

The transportation end of the park proposition has presented some interesting problems. Cars from the city loop at the park in a prepayment area, those bringing patrons to the park discharging their load at the side of the loop remote from the entrance gates. The patrons then enter the park through a subway which passes under the prepayment area. Those leaving the park do so through prepayment gates, the approach to which is up a rather steep incline. This natural feature is utilized to slow down the loading, thus effectively preventing crowding at the gates.

Latest Type of Double-Deck Car

THE English have had a great deal of success with double-deck street car operation and the Ilford Council Tramways has just placed in service a late design of double-deck car. The cost of the car is given as about $10,000 and the car has a seating capacity of sixty-four, the lower saloon accommodating twenty-six, the upper thirty and the canopies eight. The car is 30 ft. 6 in. over all in length, 16 ft. 6 in. over all in height and is mounted on a single truck with 8-ft. wheelbase. Ceilings are of aluminum and are arranged in three panels. A patent type of seat is used which folds back against the side of the car when desired, permitting free passage and speeding up car cleaning.



A SIXTY-FOUR PASSENGER DOUBLE-DECKED CAR

The trucks are of the pendulum type, with the rigging that supports the side frames on the axle boxes consisting of independent longitudinal supporting frames, suspended flexibly from the truck by U-shaped saddles. This has the effect of increasing the wheelbase by 2 ft. and permits the wheels and axles to move laterally, independent of the side frames. The cars are equipped with 35-hp. motors and with Thomson-Houston K-10 controllers. The gears and pinions are of tool steel.

The cars are painted sage green and cream, are fitted with curtains and are finished in mahogany inside. They have illuminated destination indicators in each canopy and are very neat and attractive in appearance, as shown by the photograph.

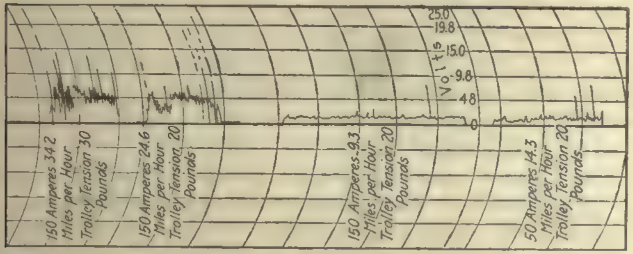
An appropriation of $85,000 has just been authorized to the Bureau of Standards for the investigation of standards of practice and methods of measurements of public utilities, such as gas, electric light, electric power, water, telephone, central station heating and electric railway service.

What Happens at the Trolley Contact?

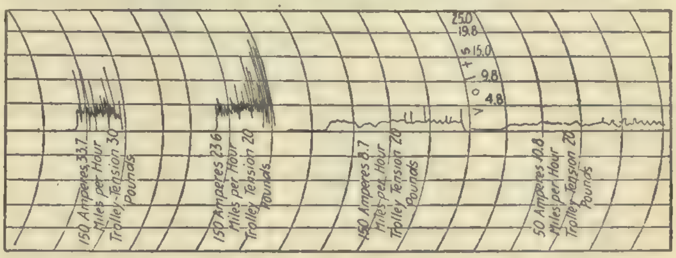
Results of Numerous Tests Under Various Operating Conditions Are Given—Average Power Loss with 5-in. Wheel Was Nearly ½ Kw.

By D. D. EWING
Professor of Electric Railway Engineering Purdue University, Lafayette, Ind.

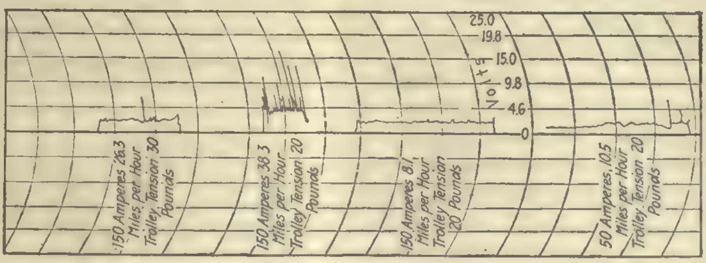
VIEWED from the standpoint of mechanical performance, the device that collects the propulsion current for an electric car has a hard job. "It must work in fair weather and in foul, particularly in foul weather," says the riding public. It must not interrupt the power circuit, and, therefore, it must keep in close touch with the contact line, which to the collecting device seems to have a chronic habit of continually bobbing up and down. On an interurban car it may be required to gather up a hundred or so amperes with the car traveling 60 or 70 miles per hour. We would like to have it do all of these things without losing any of the energy collected and without wearing either the device itself or the line with which we desire it to maintain such close contact. Also, economic considerations require that the device be cheap both in first cost and in maintenance.



CONTACT VOLTAGE GRAPHS FOR A 5-IN. V-GROOVE WHEEL



CONTACT VOLTAGE GRAPHS FOR A 5-IN. U-GROOVE WHEEL



CONTACT VOLTAGE GRAPHS FOR SLIDING SHOE TROLLEY

The several requirements are more or less incompatible and an ideal device is one of the impossibilities. Any practical design necessarily involves compromises. In America the wheel trolley has given such good account of itself in the street and interurban railway fields that it has more than held its own against all comers. The tendency has been to develop this device to the point of greatest utility rather than spend time and money on other possibilities. But the wheel trolley is not a long-lived device and it does cause considerable wear on the trolley line. Because of these things railway operators, in their attempts to cut down maintenance expense, recently have been giving some thought to other contact devices. In this article some data on the electrical performance of the wheel and sliding shoe trolleys are presented.

In 1907 some experiments on trolley contact phenomena were made at Purdue University by G. M. Laird in connection with his graduation thesis. These experiments were performed in the laboratory, actual operating conditions being simulated as closely as possible. A standard 6-in. trolley wheel with pole and base was used, but instead of having the pole move with reference to the wire the wire was moved with reference to the pole. The voltage drops between wheel and trolley wire and between wheel and harp were measured for a number of different speeds, currents and trolley tensions. From the experimental data thus obtained, the several resistances and losses were calculated. The mechanical loss, that is the frictional loss, due to the rotation of the wheel and the contact between wheel and wire, was also measured. The several losses and resistances for 30-lb. trolley tension at different speeds and currents are shown in accompanying curves. It will be noted that the electrical loss at the wheel-wire contact for 150 amp. and 20 m.p.h. is 130 watts, while the mechanical loss is only 36 watts.

Briefly summarized the conclusions drawn from these tests are:

Both of the contact resistances decrease with increased current and trolley tension and increase with increased speed.

The voltage drops across these resistances increase with the speed and increase (slightly) with the current.

All of the losses increase very rapidly with increase in the speed.

The voltage drop between the wheel and the wire is the larger of the two voltage drops.

ARCS AT WIRE SUPPORTS USE MUCH POWER

In 1915, while making a series of tests on interurban cars, the writer made a number of measurements of the voltage drop between the trolley wire and the trolley base. In these tests the front trolley was used as a voltmeter contact on the trolley wire. The data show that for speeds between 37 and 45 m.p.h. and for currents between 190 and 225 amp. the average voltage drop with the wheel running on smooth wire between span supports was 3 volts. At the points of trolley wire support voltmeter "throws" ranging from 5 volts to "off scale" on a 75-volt range meter were recorded. On the assumption that two-thirds of the voltage drop under smooth running conditions was chargeable to the wheel-wire contact the voltage drop at this contact would be 2 volts, and the watt loss at 200 amp. would range from 400 watts for smooth running to over 15 kilowatts for the arcs which caused the large voltmeter deflections.

PURDUE TEST CAR AND TROLLEY ARRANGEMENT

COMPARATIVE TESTS ON WHEELS AND SHOE

Last year, C. P. Boggs, A. C. Clinger and W. V. Stockton, then seniors at Purdue University, working under the writer's direction, made some further investigations of trolley contact phenomena.

Tests were made on four wheels and one sliding shoe. Three of the wheels were manufactured by the Star Brass Works and are listed by the manufacturer as numbers 1, 2 and 20 respectively. The other wheel was manufactured by Vaile & Kimes. The principal physical features of the wheels and shoe are as follows:

Wheel	Kind of Groove	Throat Diameter, Inches	Weight, Pound (Including Harp)
No. 1	V	5	7
No. 2	U	5	7
No. 20	U	10	15
V. & K.	V	4½	6½
Miller Shoe	U	..	5¾

The tests were run on the Battle Ground Line of the Fort Wayne & Northern Indiana Traction Company. This is a stub end line whose overhead distribution system consists of a No. 0, B. & S. round copper trolley wire tapped to a paralleling feeder every quarter mile. The poles were spaced 100 ft. apart. In most of the tests the test car was the only car operating near the stub end. The test track was practically level and contained only one curve, which was short and of long radius. The Purdue Test Car with the trolleys arranged as shown in the accompanying illustration was used in making the tests. Car speed, contact voltage drop and current were measured. The front trolley was used as one voltmeter lead contact and the other lead was connected to the collecting trolley base. The voltage drop measured, therefore, consisted of the drop in the trolley wire between the two wheels, the drop across the wheel-wire contact, and the drop between the wheel and trolley base. The latter drop, as measured with the car standing still, was 0.6 volt per 100 amp. As the distance between the trolley wheels was 21 ft., the drop in the trolley wire was due to the resistance of that length of No. 0 wire or 0.2 volt per 100 amp. All of the runs were made with the car moving toward the stub end of the line, but on account of the feeder system, the trolley wheel was, of course, fed from both directions. On the assumption that 50 per cent of the current passed through the trolley wire in front of the collecting wheel the voltage drop in the trolley wire was 0.1 volt per 100 amp. of car current and the total voltage drop, exclusive of the contact drop, was 0.7 volt per 100 amp.

In order to protect the low range voltmeter from excessive voltages such as would occur in case the collecting trolley left the wire, the connections used were those diagrammed in the accompanying reproduction. The circuit breaker was of the type used for protecting telephone circuits from stray power currents and proved itself to be a very satisfactory protective device.

In making the tests it was of course desirable to hold both current and speed constant. As the variation in line voltage made such a procedure impossible, the current being most easily controlled was made the constant quantity. Adjustment to meet the varying voltage conditions was effected by means of series resistances and the car brakes. The speeds marked on the accompanying graphic meter records are the averages for the respective runs.

The paper chart traveled at the rate of 1 in. in 1.15 minutes. Test runs involving a variety of combinations of speed, current and trolley tension were made, the charts here reproduced being for a few representative runs.

The charts are of especial interest as they show clearly what happens at the trolley contact. The ripples in the graphs are due to the trolley wire hangers and joints. With the wheel trolleys it is almost possible to count the wire imperfections, particularly in the low speed graphs. At higher speeds the ripples are greatly magnified. Each ripple represents the voltage drop over a small arc.

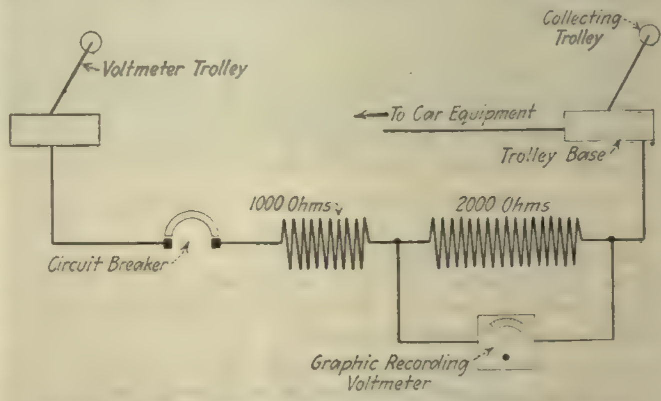


DIAGRAM OF THE CONNECTIONS USED IN MAKING VOLTAGE MEASUREMENTS

The arcs cause pitting both of the collecting device and the wire. The pitting of the wheels is affected in a marked manner by the shape of the groove as is indicated in the following comparisons:

Location	U-Groove	V-Groove
Bottom of groove	Small uniformly distributed pits	No pits
Sides of flange	Few small pits	Many large pits
Edge of flange	Many large pits	Few small pits

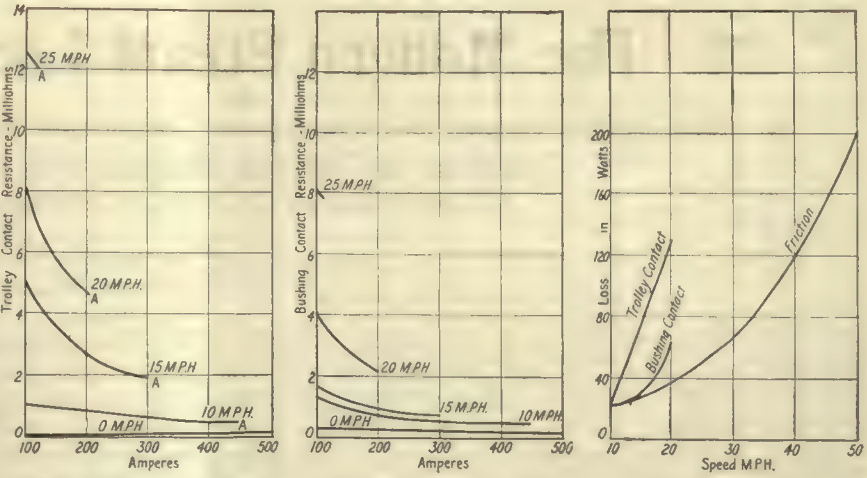
Owing to its great weight the 10 in. wheel did not prove satisfactory. Its inertia prevented it from following the wire as it should and the arcing was excessive except at very low car speeds.

CONCLUSIONS DRAWN FROM TESTS

The general conclusions drawn from the test data and from an inspection of the collecting devices after the tests were finished may be briefly summarized as follows:

The average voltage drop increases slightly with an increase in current and markedly with an increase in speed.

Increase in speed affects the character of the ripples in the voltage graph. At low voltages the ripples represent a voltage change of only a fraction of a volt, while at higher speeds the amplitude of the ripples or "throws" indicates serious arcing.



Relation between trolley contact resistance, speed and current, trolley tension 30 lb.

Relation between bushing contact resistance, speed and current, trolley tension 30 lb.

Current of trolley wheel losses, trolley tension 30 lb., current collected 150 amp.

CHARACTERISTIC CURVES OF TROLLEY WHEEL CONTACT LOSSES

The voltage ripples were less pronounced with the higher trolley tensions than with the lower ones.

Of the two types of wheels the arcing was far less serious with the V-grooves than with the U-grooves.

There was far less arcing with the sliding shoe than with the wheel trolleys.

A calculation of the power loss at the trolley contact is of interest. For example, the average contact drop for the 5-in. V-groove wheel when collecting 150 amp. at 24.6 m.p.h., trolley tension 20 lb., is 4.3 volts. Correcting this for the voltage drops in the other part of the circuit at the rate of 0.7 volt per 100 amp. gives a contact drop of 3.3 volts. This voltage multiplied by the current, 150 amp., gives 495 watts.

Now an energy consumption of 500 watts is not at all alarming as far as the energy consumption of the car is concerned. At 25 miles an hour such a loss would amount to only 20 watt-hours on a car-mile basis. The important thing about it is that this energy loss must be dissipated in the form of heat at the very small area of contact between wire and wheel. Inasmuch as there is not time for the heat to be conducted away, the heating is highly localized. The momentary arcs indicated by the larger "throws" are quite destructive and cause the larger pits so often observed on trolley wheels and the contact wire.

As the wear on any device is dependent on the work done on the device, the energy expended in heat on the various parts of the device should be a pretty good measure of the wear. The investigations detailed here indicate that the electrical energy losses at the contact exceed by a very considerable amount the mechanical energy expended in overcoming friction.

CATCHING THE "THROWS" WITH GRAPHIC RECORDERS

The above data are not presented with the thought that they answer the question "What Causes Trolley Wire Wear?" but they are presented with the thought that the electrical losses at the wheel-wire contact have an important bearing on the subject.

Irrigation Limits Water-Power Development

A UNIQUE condition exists in connection with many projected water-power developments in the West which has been met very largely by water wheel manufacturers. Irrigation is the primary object in water storage developments and the electric power is only incidental. This requires a water wheel or turbine which must act under variable head and flow conditions and also requires a large capacity in auxiliary steam plants or ample provision for interconnection to render available a constant supply of electric power.

At Fontana, Cal., in connection with an irrigation project a total gross head of 725 ft. was made available by a pipe line 6 miles long, but irrigation requirements caused a variation in head and flow ranging from 58 sec.-ft. with 505 ft. head to 10 sec.-ft. and 657 ft. head. Under these conditions flexibility and efficiency were essential elements of the impulse wheels to be installed. Two 1,350-hp. Pelton double-overhung, two-runner, impulse turbines equipped with electrically operated needle nozzles and governor-operated jet deflectors were installed. These wheels show an efficiency at the lowest operating point only 3 per cent less than the maximum developed under most favorable conditions. As the quantity of water flowing is the governing factor and not the load, the governing apparatus was designed to operate by water flow variation, which is a radical departure from practice where load demand and not water flow is the controlling factor. It is gratifying to the railway industry to know that these conditions have been met in prime mover design, as the new water-power law will expedite many combined irrigation and water-power developments in the near future.

The Modern Steam Locomotive*

The Author Shows How the Steam Locomotive Has Been Improved and Compares the Modern Machine with the Electric Locomotive from Several Standpoints

BY JOHN E. MUHLFELD
Railway & Industrial Engineers, Inc., New York City

IN MAKING comparisons of the relative values of steam and electric railway power some electrical engineers have frequently given out such an attractive and confident line of loose figures that railway managers and their engineers have often been misled into making recommendations that have later resulted in embarrassment. Comparisons have been made between the operations of new, up-to-date electric and of obsolete steam installations, of costs of repairs per locomotive-mile for electric and steam locomotives of different dates built new and of different average ages, and of fuel rates at the substations of modern central power stations with fuel rates of obsolete steam locomotives, per horsepower-hour. Also, assumptions have been made of extraordinary steam locomotive standby fuel losses, inclusion of steam locomotive tender, but exclusive of electric locomotive non-adhesive weight as non-revenue train tonnage, and of like erroneous factors. It is just as misleading to compare the most efficient electric locomotive operation on the St. Paul with that of its saturated steam locomotives of 1910 as it would be to compare the most efficient superheated steam locomotive performance on the Baltimore & Ohio with that of its electric locomotives.

In line with the foregoing several years ago a report was made on the advisability of electrifying about 275 miles, or a division, of one of the more prominent Western lines, and an erroneous comparison was made, first, between the existing antiquated and uneconomical steam and an up-to-date electric operation, and, second, by omitting the investment required to bring the steam operation up to date. When all involved factors were properly adjusted the net capital expenditure of $4,000,000 required for electrification compared with $1,000,000 as needed for modernizing the steam equipment, and the estimated annual operating saving of approximately $750,000 from electrification was wiped out and replaced by a saving of $250,000 from a continuation of the improved steam operation.

When we discuss or recommend the further electrification of the whole or any part of the 260,000 miles of steam-operated railroad system in the United States, which is now making use of about 65,000 steam and 375 electric locomotives for its passenger, freight and terminal service, the most important item involved is a comparison of the most up-to-date steam with similar electric operations, after which come the important factors of financing and legislation.

While there is much existing steam road trackage that can and should receive first consideration as regards electrification for the purpose of eliminating gases from underground terminals and tunnels and to give relief to terminal or line traffic congestion in the vicinity of large commercial and industrial centers, it would be financial suicide to electrify immediately adjacent connecting and intermediate mileage, particularly in view of the improvements that can be made in both existing and new steam locomotives in the matter of reducing smoke, sparks, cinders and noise and in increasing general efficiency and economy.

With the decreased value of gold and purchasing power of the dollar has come an increase of from 4 and 5 to 7 and 8 per cent in the cost of money, which in combination with the 100 to 150 per cent increase in the cost for labor and material makes the procurement today of the most pressing railroad capital needs almost prohibitive. Therefore, when engineers and politicians propose reckless super-power plans for the electrifying even of such belts of steam roads as lie in the densely populated district between Washington, D. C., and Boston, at a new capital cost approximating $1,000,000,000, and in addition mark off the books the principal value of existing steam locomotives, passenger cars, shops and terminal and intermediate facilities that would be unsuitable for the electrified service, they are planning either a new road to railroad bankruptcy or a further burden in traveling and shipping costs, or in taxes, which would be representative of criminal waste instead of increased earning capacity by means of more efficient and economical operation.

Therefore, before the electric locomotive can be made permissible for general application the electrical engineer must reduce his first costs, promote interchangeability, provide a motor which will efficiently, economically and flexibly cover a wide range of speeds and not break down or deteriorate from overloading and heating, reduce complication, wear and corrosion in transmission and contact line apparatus and substantially reduce the current losses between the point of power production and the locomotive drawbar. Likewise the steam railway mechanical engineers, locomotive builders and specialty manufacturers, if they are to guard the steam locomotive and continue it in its present field of usefulness, must become more active in modernization and bring about improvements that will substantially increase its capacity and thermal efficiency by the use of higher steam pressures and superheat, compounding, more efficient methods of combustion, utilization of waste exhaust steam and products of combustion heat, better distribution and use of live steam, reduction of dynamic weights, greater percentage of adhesive to total weight and a lower factor of adhesion and by a substantial reduction in standby.

As both steam and electric locomotives should have a useful life of from twenty-five to fifty years from the date built these policies should be inaugurated now in order that the least artificial age will be capitalized in all new built motive power.

In order to determine the relative advantages of modern steam and electric locomotives the items discussed hereinafter may be stated as important items for consideration.

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*Abstract of paper read at joint meeting of A. S. M. E. and A. I. E. E. sections, New York City, Oct. 22, 1920.

1. *Legislation.*—This may be of such varied character that any assumptions for analysis purposes are out of the question.

2. *Financing.*—The electrification of the steam roads in the United States since 1895 now embraces about 1,250 road-miles on eighteen different lines and 375 electric locomotives, of which total about 375 road-miles on nine different lines and 230 locomotives (as well as 1,000 motor cars) are located in the territory between Washington, D. C., and Boston.

In view of past experience probably little if any financing of steam road electrification projects in the United States can be undertaken, particularly at present interest on money and labor and material prices, unless the returns are more adequately and fully guaranteed. In fact, few if any existing steam roads can justify or stand the additional capital investment required per mile of road for electrification, except for short distances under very special conditions such as prevailed on the Norfolk & Western, where the ventilation and 1.5 per cent grade line features of a ⅝-mile single-track tunnel restricted the train movements to a 6-mile-per-hour basis on a congested traffic section of the main line, and even then only providing the fixed charges and operating expenses are not too excessive.

The immediate requirements of new money for the more urgent steam equipment and facilities needed to provide adequate, safe and expeditious rather than luxurious service in the regeneration of the railroads is the obvious reason for the continued utilization of the over-all more economical steam operation, and only after the possibilities in this direction have been realized can any serious financial consideration be given to the proposed radical change to super-electrification.

3. *Adaptability to Existing Trackage and Facilities.*—First and foremost in the advantage of a continuation of the existing improved steam locomotive for all purposes for which it is permissible is its flexibility and adaptability to existing railroad trackage and terminal and operating facilities and the relatively low first cost at which it can be purchased per unit of power developed for the movement of traffic. Being a self-contained mobile power plant, it is possible quickly to transfer needed or surplus power from one part of the line to another and to concentrate it when and where necessary.

4. *Effectiveness in Increasing Track Capacity.*—Without a doubt electrification increases the capacity of a terminal, and this is fully evidenced by the intensified traffic movements at Grand Central Station, in New York, and at Broad Street Station, in Philadelphia; but an analysis of the situation on the New York Central shows that this is not due to decreasing locomotive movements through the use of multiple units as is usually stated. Special line conditions, as on the Norfolk & Western, may make electrification advisable for short distances, but neither the results on that road nor at the New York terminals justify the frequent reference by electrical engineers to the weakness of steam locomotive haulage during the unprecedented cold weather and volume of traffic conditions during the winter of 1917-18, in that electrification would not have obviated the difficulty. Furthermore, in the handling of heavy tonnage trains by the unlimited combining of electric locomotive units the factors of peak load, transmission lines and power plant capacity must all be considered with the probability that permissible modern steam locomotive train units can be more economically handled over dense traffic lines than the electric multiple-unit super-trains.

5. *Train Speeds.*—The average freight car is in main line movement only about 10 per cent of its life. The balance of its time can be distributed 55 per cent in the hands of the railroads on account of interchanges, yard and loading and unloading track movements, surplus cars, repair tracks and road delays, and 35 per cent in the hands of the shipper and consignee, due to loading and unloading reconsignment and Sundays and holidays. Therefore, increasing train speeds beyond established economic limits at the sacrifice of tonnage, and with an increase in fuel, track and equipment upkeep and danger of operation, is not the solution of the freight traffic problem. As the electric locomotive is a constant-speed proposition, whether going up or down grade, and is unable to utilize its rated capacity and effectiveness through the same range of speed and tractive power variations as the more flexible steam locomotive, the latter can therefore be more efficiently operated over the continually changing up and down grades, levels, curves and tangents traversed by the average freight train in this country. With respect to passenger train service, where speed is more of a factor, the steam locomotive performance is equally satisfactory.

6. *Fuel Consumption.*—Great economy in fuel consumption and cost is the principal claim for electrification. Eminent electrical engineers have recently arrived at the startling conclusion that had the railroads of the United States, using 63,000 steam locomotives, been completely electrified in 1918 along lines fully tried out and proved successful today, they would have required, without the use of any water or other power, only 53,500,000, instead of 176,000,000, tons of coal or its equivalent, thereby effecting a modest saving of more than two-thirds, or 122,500,000 tons.

The basis for arriving at these comparative figures is for the steam operation a coal rate of 12.75 lb. per kilowatt-hour of useful work done, as measured at the driving wheel treads, or 7 lb. (including transmission and conversion losses inherent to electrical operation) as measured at a central power station. These data were obtained from some tests made in 1910 on the St. Paul on some probably long since antiquated types of saturated steam locomotives. For the electrical operation a modernized central power station coal rate of 2½ lb. per kilowatt-hour, in combination with a 40-watt hour rate at the point of delivery of the power to the railroad system for moving a gross ton-mile of passenger and freight train, was used, which would produce a movement of 1,000 average gross ton-miles for 100 lb. of coal of about 12,000 B.t.u. value per pound as fired. In arriving at these data apparently factors were overlooked or disregarded such as gradient and curvature, drifting train-mileage, human element, the necessity for hauling one-third of the freight car-miles without lading and its effect on train resistance, the use of 15,000 locomotives in switching and transfer service, the existence of 25,000 steam locomotives equipped with superheaters and of 35,000 equipped with firebrick baffle walls, the past ten years' improvement in steam locomotive boilers and machinery, that electrification will not eliminate the rail haulage of company coal or of dead weight on locomotive leading and trailing truck wheels, that large central power stations will only show a fuel saving when operated somewhere near their rated capacity without peak load conditions, that the interconnecting of electrification systems will result in prohibitive conversion and transmission losses, that electric motors must operate at predetermined loads to produce maximum efficiency, that central power stations cannot be regulated to a basis of 50 per cent average load factor, and many others.

However, accepting the assertion that the proposed electrification will produce 1,000 gross ton-miles for an average of 40 kw.-hr., or 100 lb., of 12,000-B.t.u. coal, as stated and generally approved by electrical engineers, what can the modern steam locomotive do to justify its existence? The results of some dynamometer-car tests made during 1918 may be of interest. The steam locomotives tested were of the ordinary superheated Mikado freight type, weighing 110 tons. One locomotive was fitted for hand firing and burning coal on grates, while another was equipped with the "Lopulco" system for burning powdered coal in suspension, and the tests were made in tonnage freight service handling from 2,400 to 2,600 tons eastbound and from 1,850 to 2,250 tons westbound on the Santa Fé main line between Fort Madison, Iowa, and Marceline, Mo. (the profile consisting of 0.8 per cent ruling grades), a distance of 112.7 miles, during March and April, 1918. The comparative average results show a coal consumption of 3.74 lb. and 4.99 lb. per boiler and superheater horsepower-hour for the two engines respectively.

As the coal supplied to the grates of the hand-fired locomotive was considerably lower in heat value than that specified in the electrification project, and as the tests were run during March and April, it can be assumed from the foregoing that the average yearly performance will approximate 100 lb. of 12,000 B.t.u. coal per 1,000 gross ton-miles, or equivalent to what we are promised by electrification.

7. *Efficiency of Locomotive Operation.*—The offsetting fuel and energy losses, due to standby in the steam operation, and decrease in efficiency on account of fluctuating loads in the electric operation must not be lost sight of. Neither should those incident to the transforming transmission and conversion of electric current and like factors be neglected.

While the electrical engineers and manufacturers in this country deserve great credit for the progress made in the development of the electric locomotive, they have as yet been unable to design one which can operate at maximum efficiency throughout its range of load.

Furthermore, to produce electric current at various hydro-electric or steam power plants, to raise the voltage to a high value, transmit the power through transmission lines to switching substations, to step down the voltage and then convert the power into direct current at, say, 3,000 volts for locomotive use, all involve expensive lines, plants and equipment, as well as tremendous losses from the generator at the central power station to the bus bar on the direct current side of the transformer, where the current is usually metered for billing. Also the secondary system is responsible for further losses. After allowing for, say, 10 per cent regeneration, the actual dead loss in power from the central power station to the electric locomotive drawbar will be not less than 50 per cent.

The number of factors entering into an analysis of the net thermal efficiency of the electric locomotive, in terms of drawbar pull, are so many as to make it impossible with the lack of dynamometer-car and laboratory test data to arrive at a figure which is not based on a number of assumptions, but as a matter of interest, assuming that *all of the factors are affected equally* in the electric locomotive, the net thermal efficiency at the drawbar, when taking into consideration the boiler, engine, generator, step-up transformer, alternating-current transmission, step-down transformer, a.c.-d.c. converter, direct-current transmission, motors and machine efficiencies, may, as representative of average existing practice, be illustrated as in Table I.

TABLE I—ESTIMATED EFFICIENCIES IN ELECTRIC TRACTION

Equipment	Net Thermal, Per Cent	Load Rating, Per Cent 100	75	50
Boiler	Factor	.....	.....	.....
	Efficiency	76.7	76	72
Engine	Factor	18.25	18.29	19.17
	Efficiency	14	13.9	13.8
Generator	Factor	90	89.5	86
	Efficiency	12.6	12.44	11.88
Transformer, step-up	Factor	98	96	90
	Efficiency	12.34	11.93	10.67
Transmission, alternating current	Factor	90	95	97
	Efficiency	11.10	11.32	10.34
Transformer, step-down	Factor	98	96	90
	Efficiency	10.87	10.85	9.30
Converter, alternating to direct current	Factor	80	75	63
	Efficiency	8.69	8.13	3.85
Distribution, direct current	Factor	90	95	97
	Efficiency	7.82	7.71	5.66
Motors, direct current	Factor	91.5	90.8	89.5
	Efficiency	7.15	7.00	5.05
Machine efficiency	Factor	81	85	90
	Efficiency	5.79	5.95	4.54

Likewise the net thermal efficiency of existing representative steam locomotives, in terms of drawbar pull, may be illustrated as in Table II.

TABLE II—ESTIMATED EFFICIENCIES IN THE STEAM LOCOMOTIVE

Equipment	Superheated or Saturated	Net Thermal, Per Cent	Load Rating, Per Cent 100	75	50
Boiler	Superheated	Factor	.....	.....	.....
		Efficiency	42.7	54.9	65.9
	Saturated	Factor	.....	.....	.....
		Efficiency	45.0	57.4	70.0
Cylinders	Superheated	Factor	11.9	11.0	10.5
		Efficiency	5.08	6.04	6.92
	Saturated	Factor	7.8	8.4	7.8
		Efficiency	3.51	4.82	5.46
Machine	Superheated	Factor	75	80	85
		Efficiency	3.85	4.83	5.88
	Saturated	Factor	77	[illegible]	82
		Efficiency	2.70	3.86	4.47

Comparing the electric and steam locomotive figures as illustrated, the relative percentage of power delivered at the track rails to 100 per cent B.t.u. in the coal would be as in Table III.

TABLE III—COMPARISON OF EFFICIENCIES OF STEAM AND ELECTRIC TRACTION

Kind of locomotive	Net Thermal Efficiency at Load Ratings of 100 Per Cent	75 Per Cent	50 Per Cent
Electric	5.79	5.95	4.54
Steam, superheated	3.85	4.83	5.88
Steam, saturated	2.70	3.86	4.47

As 100 per cent load rating conditions would, in practice, occur only momentarily and as the majority of the drawbar load represents from 30 to 60 per cent of the locomotive maximum drawbar capacity, comparison should properly be made only of the net thermal efficiencies at 50 per cent load ratings.

At speeds of from 15 to 75 m.p.h. the existing superheated steam locomotive thermal efficiency actually ranges from 5.3 to 8.1 per cent as compared with the calculated figures of from 4.83 and 5.38 per cent for 75 and 50 per cent load ratings, respectively. Adding to this an increase of from 15 to 50 per cent in net thermal efficiency that may be produced from developments now under way and the steam locomotive of the future will be quite a respectable assembly of engineering efficiency.

8. *Cost for Enginemen.*—When the use of the electric locomotive was contemplated it was thought that a single motorman could be substituted for the steam locomotive engineer and fireman. Under existing conditions this is neither permissible nor practicable, and as each electric locomotive must carry a man comparable to but who does not function as a fireman, his wage is an added expense without economic return and must be charged to the cost of firing the central power station boilers or otherwise distributed.

9. *Cost of Maintenance.*—In determining the maintenance cost of the electric locomotive a true comparison can only be made by including all corresponding elements as found in the self-contained steam locomotive which goes back to the upkeep of all facilities having to do with the utilization of the fuel or water power, including the central power station buildings, boilers, engines, conversion, transmission, distribution and contact line systems, substations, track rail bonding and insulation, electric disturbance cut-outs or neutralizers, extra expense in upkeep of the electric zone trackage and like auxiliaries, and finally the electric locomotive itself.

10. *Peak-Load Conditions in Relation to Traffic Requirements.*—With the steam locomotive the traffic requirements are met by the distribution and utilization of the necessary number of self-contained motive power units as required, regardless as to the capacity of one or more central power stations or of any limitation in quantity, or in price, of the total available power output. The operation of one or of 500 steam locomotives at their maximum capacity at any given, or for any duration of, time on a single division is of no concern. However, in order to meet the ideal conditions for electrification, the traffic should be uniformly spread or scattered over the twenty-four-hour period, whereas in the majority of cases train movement is based on traveling and shipping conditions and cannot be advanced or delayed in order to eliminate peak-load conditions.

11. *Ease of Starting Trains.*—Due to the uniform torque as developed by the electric locomotive, its adherents have laid great stress on its ability to start a heavier train than a steam locomotive of relatively the same tractive power and factor of adhesion. In steam railroad service the locomotive is seldom required to start "the train," but what it does is to start each car in the train, successively, and which nullifies this theoretical advantage of the electric locomotive. In fact, with steam locomotives of the Mallet and other types having cylinders equipped with properly designed simpling devices the starting power is increased about 20 per cent as compared with electric locomotives of equivalent road rating.

12. *Rate of Acceleration.*—In order that the desired running speeds can be reached in the minimum of time after the starting of trains, the ability of a locomotive to rapidly accelerate its load is of considerable importance, and in this respect the electric power has had the advantage. The steam locomotive engineer has, however, not lost sight of this fact and improvements already made in boiler and cylinder horsepower ratios, as well as developments now under way for the utilization of existing non-productive adhesive weight and to increase the coefficient of friction between the propelling wheels and the track rails, will enable the steam locomotive to duplicate the performance of its electric competitor in this regard.

13. *Train Braking.*—Since the development of regenerative braking with the electric locomotive, great emphasis has been laid on the increased security of operation over heavy grade lines due to the ability of the locomotive to hold the train under complete and positive control on the down grade without brakes, by temporarily converting the main motors into generators to produce electricity, which is returned to the line for use by some other locomotive in pulling a train. Considerable attention has also been directed to the saving brought about through the elimination of the ordinary air braking on such down grades. The Baltimore & Ohio has, with steam locomotives, successfully and safely handled its heavy tonnage and dense traffic on the Cumberland and Connellsville divisions for many years, and this tonnage descends a grade averaging approximately 2.2 per cent for 17 miles, at an average speed of from 15 to 20 miles per hour for freight and from 25 to 30 miles per hour for passenger trains, without slow-downs or stops. This performance is comparable with that on the worst grade conditions in the St. Paul electrified zone.

14. *Effect of Weather Conditions.*—Even though the full steaming capacity, horsepower and drawbar pull of a modern steam locomotive can be developed during cold weather conditions, there are the factors of radiation and freezing to be reckoned with, which gives the electric locomotive the advantage in winter, particularly as its effectiveness is greater on account of the lesser tendency for the motors to overheat. This winter advantage, however, is largely overbalanced during the summer, when the main motors heat, especially under overloads, and require cooling at terminals or otherwise overheat and result in insulation break-downs or burn-outs, or other troubles.

15. *Road Delays and Tie-Up.*—While the electric locomotive has the advantage of not being required to take on fuel and water, except for the operation of steam-heating equipment for passenger trains, with the increased capacity of the modern steam locomotive tenders and the lower water and fuel rates per drawbar horsepower developed, the delays due to taking on these supplies have been greatly reduced and need not be serious. Barring collisions, wrecks and like accidents not due to the system of motive power in use, steam operation is not susceptible to complete tie-ups as is the case with electrification.

16. *Terminal Delays.*—There is no doubt but that the electric has an advantage over the steam locomotive as regards time required for periodical boiler work, fire cleaning and rebuilding, fueling and watering except where fuel oil is used, but where terminal delays occur due to waiting for trains, such as the foregoing statement set forth, the time required for such work does not become an expensive determining factor in the daily average miles to be obtained per locomotive. Also the fact that the electric locomotive cannot, without terminal rest periods or without the consumption of power to operate auxiliaries, operate at its maximum capacity must not be overlooked. Furthermore, many improvements in the fuel and ash handling and combustion equipment of the steam locomotive using coal are now in process and terminal delays due to these causes are annually being reduced by improved means and methods.

17. *Hazards.*—With the establishing of more scientific and careful methods of designing, testing and inspection, and the more extended use of safety appli-

ances, the failures of steam locomotive boilers and machinery, particularly those resulting in personal injury, are relatively low as compared with the work performed. It is therefore doubtful if there is any greater proportion of risk from the steam locomotive in that regard than from electrocution and other attendant dangers from high-voltage electrification.

Transportation Possibilities with Electric Locomotives*

Summary of Savings Secured by Electrification of Steam Roads—Co-operation Between Electric and Steam Locomotive Designers Urged

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Director of Heavy Traction
Westinghouse Electric & Manufacturing Company

THE steam locomotive is a marvelous machine, representing to a wonderful degree the combination of designers' skill and years of experience. The electric locomotive, on the other hand, while a notable machine, should, in its present service, be taken as indicative only of what may be accomplished in the future. The transportation problem is about the most serious one which now confronts the American people. For a number of reasons, for only part of which the railroads are responsible, provision for the movement of railroad traffic has fallen far behind the productive capacity and needs of the country today. At the same time, the demand for traffic movement will undoubtedly be doubled in about twelve years. So the question arises, What are we going to do, and how are we going to do it?

The limit to physical expansion of railroad line and terminals has been about reached in many cases, on account of both the prohibitive cost and the inefficiency of terminals of unworkable size. A large measure of relief can still be secured by line and terminal revisions and improvements, but when the inevitable increase in the demand for traffic movement of the future is considered these expedients to secure relief are seen to be only temporary and very limited in extent.

The great need of the country is the free and expeditious movement of traffic. The way to move traffic is to *move it* and to keep it moving. The yearly average of 22 miles per day for a freight car for the whole country, with monthly averages of as low as 5 miles on some of our most congested railroads for a single month, emphasizes the fact that this is a problem that some how, some way, we must solve. The solution lies, to a large extent, in the electrification of railroads.

With the present standards of train make-up, classification and terminal handling, electrification will double the capacity of any railroad. With the better equipment we can expect in the future, together with the evolution of improved methods of operation contingent on electric power, this capacity should be doubled again, thus securing four times the present capacity.

The electric locomotive has generally, thus far, been a mere substitute for the steam locomotive, although in some cases, due to the greater power of electric locomotive, there has been a modification of the handling of traffic. Two conspicuous examples are the Norfolk & Western and the Chicago, Milwaukee & St. Paul.

In the case of the Norfolk & Western, two electrics handle the same train as was formerly handled by three Mallet engines, but at twice the speed. In this operation, owing to the great increase in hours of road service as well, one electric locomotive is the practical equivalent of four of the Mallet engines replaced.

On the Milwaukee the notable change has been the elimination of intermediate terminals on the 440-mile electrified section between Harlowtown, Mont., and Avery, Idaho. There is at present a single intermediate engine terminal, but the latest passenger locomotives are detached from trains at this terminal for inspection and work only, which takes place about once in eight or ten trips. On regular schedule those engines make a run of 440 miles each day, being taken off for inspection at Deer Lodge after a mileage varying from 3,000 to 5,000. On occasion, when due to a schedule derangement engines have been maintained in continuous road service for thirty hours or more, for a full day of twenty-four hours records up to 766 miles in this mountain service have been established.

The advantages of electric power are its great flexibility and mobility. The difference between steam and electric locomotives is fundamental. The steam locomotive carries its own power plant, while the electric locomotive, on the other hand, is simply a transformer of power. The design of the steam locomotive is circumscribed by the necessity of tying up the rest of the machine to a steam boiler. On the other hand, the electric locomotive assembly can differ amazingly as to type, length, axle loading and driving connections. A group of small motors does not differ materially from a single large motor in efficiency. The speed and power, therefore, of an electric locomotive is limited only by conditions of track and construction, and of car equipment. It is entirely practicable to build an electric locomotive to take any train which will hold together, over any profile whatever and at any desired speed. Therefore, it should easily be practicable greatly to increase the speeds of freight trains so that they could all run at a common speed not very different from that at which the superior trains are operated.

Again, with the retirement of the lighter and weaker car equipments, a material increase in the weights of trains will be realized. Without the limitation in train speed commonly accepted as a handicap to operation of tonnage trains, who can say what the limit to train load will be with electric power? Every other industry that has been electrified has experienced a revolution in methods and service due to electrification. This should be equally true in the case of the movement of our railroad traffic.

Our present methods have been built up entirely under the necessities and limitations of the steam locomotive. This is evidenced by the existence of intermediate terminals at the ends of all the so-called engine districts, where all traffic halts. Again, the steam locomotive requires attention en route, needs supplies of water and coal, and, because of its slow movement when hauling our present tonnage trains, it is frequently sidetracked for superior trains, and thus there are more and still more halts to traffic.

Car inspection now takes place at the terminus of each engine district. If, under condition of electric operation, the engine district can be increased to 200, 400 or even 500 miles, is there any good reason why car inspection should not be eliminated at the present intermediate terminals? In fact, is not the general standard of maintenance of equipment of doubtful value on the present basis of inspection at each 100-mile interval? Cars in subway service, which is certainly full of potential hazard, are economically and reliably maintained through inspection at intervals of 1,000 to 3,000 miles. The elimination of these intermediate terminals, with the resultant necessity of keeping the trains moving on the main line, would secure an enormous increase in miles per car with a corresponding saving in equipment.

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*Abstract of paper read at joint meeting of A. S. M. E. and A. I. E. E. sections, New York City, Oct. 22, 1920.

Furthermore, with the dispatch obtained in handling trains, movement could be so marshaled and scheduled that the necessity of storing goods at terminals to protect exports and local consumption would be largely eliminated, and terminals would then become in fact, as in fiction, gateways open instead of closed.

Coming now to the comparative performance of steam and electric locomotives, it is important to bear in mind that one is a generator and the other a transformer of power. The generation of power in central stations is surrounded with many refinements, and in the consumption of coal there is every opportunity for skillful handling and supervision, so that the thermal efficiency of a modern central station is relatively high and is continuously maintained at a high value. With the steam locomotive, on the other hand, the thermal efficiency is dependent not alone upon the design of the locomotive but the manner in which it is worked, its condition, which differs widely from the best, and finally by the skill in firing. The electric locomotive, on the other hand, consumes power only when in service and works at any load at its designed efficiency. The average performance, in the case of the electric, approximates the maximum in efficiency, while the steam, on average performance, will differ widely therefrom. There is further economy due to the lesser work performed, because the electric locomotive does not have to trail supplies of fuel and water, nor is there need for the hauling of coal to points of local supply, which will always be greater than hauling to electric central stations.

There are a considerable number of different designs of electric locomotives all in successful operation, and each possessing certain advantageous features. The great latitude with which electric locomotives can be designed, while fundamentally most desirable, is in itself at the present time somewhat of a handicap. This is now the subject of intensive analysis and this study is undoubtedly developing as well a better knowledge of the running characteristics of the steam locomotive.

To state the case briefly, we are all interested in the transportation problem. Electrification is bound to be the most potent factor for its relief. We should, therefore, secure the closest possible co-operation with the engineering and mechanical skill which has been so productive in the steam locomotive field.

The Electric Locomotive in Heavy Traction*

The Several Factors in Its Application Are Stated and Illustrated by References to Data from Operating and Test Records

By A. H. ARMSTRONG
Chairman Electrification Committee General Electric Company,
Schenectady, N. Y.

A COMPARISON of the modern steam and electric locomotive leads immediately to a discussion of the relative fitness of the two types of motive power to meet service conditions. At present railway practice has closely followed steam engine development, but are we not justified in looking at the transportation problem from the broader standpoint of a more powerful and adaptable type of motive power?

A locomotive is primarily a hauling machine. Its design is defined by recognized limits such as maximum degree of track curvature, coefficient of adhesion between driving wheels and rail, gross weight and dead weight per axle, tracking qualities at high speed, etc. Furthermore, the locomotive should be simple in construction, reliable and adaptable in operation and capable of being maintained in condition for a reasonable percentage of its cost.

Accepting the Mikado and Mallet as the highest developments of steam-road and helper engines for freight service, the general comparison of Table II, shown on page 872, is drawn with an entirely practicable electric locomotive that can be built without in any respect going beyond the experience embodied in locomotives now operating successfully.

The above analysis brings out the fact that to equal the hourly ton-mile performance of one electric locomotive it would require three and four engine crews respectively for the Mallet and Mikado types.

The electric locomotive has demonstrated its very great advantages in relieving congestion on single-track mountain-grade divisions. Due to the increase in number of meeting points through its higher speed, and on account of the independence of climatic conditions of the electric locomotive and other time-saving factors, it is safe to say that the daily tonnage capacity of single-track mountain-grade divisions will be increased fully 50 per cent over possible steam-engine performance by the adoption of the electric locomotive.

TABLE I—COMMONLY ACCEPTED CONSTANTS IN HEAVY TRACTION

Limiting gross weight per axle, lb	60,000
Limiting dead weight per axle, lb	18,000
Limiting coefficient adhesion running, per cent	18
Limiting coefficient adhesion starting, per cent	25
Ruling gradient, per cent	2
Maximum curvature, deg	10
Maximum rigid wheelbase, ft	18
Maximum speed on level, passenger, m.p.h	65-70
Maximum speed on level, freight, m.p.h	25-30
Maximum drawbar pull, lb	150,000

REGENERATIVE BRAKING IS A UNIQUE ELEMENT

The hazard of mountain operation is greatest on down grades, although the perfection of automatic air

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*Abstract of paper read at joint meeting of A. S. M. E. and A. I. E. E. sections, New York City, Oct. 22, 1920.

TABLE II—COMPARISON OF STEAM AND ELECTRIC LOCOMOTIVES

	Mikado	Mallet	Electric
Type	2-8-2	2-8-8-2	6-8-8-6
Weight per driving axle, lb	60,000	60,000	60,000
Number of driving axles	4	8	12
Total weight on drivers, lb	240,000	480,000	720,000
Total weight locomotive and tender, lb	480,000	800,000	780,000
Traction effort at 18 per cent coefficient	43,200	86,400	129,600
Gross tons, 2 per cent grade	940	1,880	2,820
Trailing tons, 2 per cent grade	693	1,495	2,430
Speed on 2 per cent grade, m.p.h.	14	9	16
Horsepower at driver rims	1,620	2,080	5,570
Indicated horsepower at 80 per cent efficiency	2,030	2,600	......
Trailing ton-miles per hour on 2 per cent gradient	9,700	13,500	38,800

TABLE III—ELECTRIC LOCOMOTIVE MAINTENANCE DATA FOR 1919

	N. Y. C.	C., M. & St. P.	B., A. & P.
Number of locomotives owned	73	45	28
Locomotive weight, tons	118	290	84
Annual mileage	1,946,879	2,321,148	566,977
Cost of repairs per mile, cents	6.39	14.65	6.48

brakes has done much to modify its dangers. It is left to electricity, however, to add the completing touch to the safe control of descending trains by supplying regenerative electric braking. Aside from the power returned from this source (14 per cent of the total on the Chicago, Milwaukee & St. Paul Railway) the chief advantage of electric braking lies in its assurance of greater safety and higher speeds permitted on down grades.

The electric locomotive shows great advantage over the steam engine in cost of maintenance. Special importance attaches to this item of expense in these days of high labor and material costs. In order to draw a fair comparison, however, there should be included in steam-engine repairs all expenses of roundhouses, turntables, ashpits, coal and water stations, in fact the many items contributing to rendering necessary steam-engine service, as most of these charges are eliminated by the adoption of the electric locomotive. Spare parts can be substituted so quickly that, excepting wrecks, there is no need of the back shop for electric locomotives, unless turning tires and painting can be considered heavy repairs. Electric locomotives are now being operated 3,000 miles between inspections on at least two electrified railways and the data that are given in Table III show recent costs.

On the basis of pre-war prices, maintenance costs were approximately 60 per cent of the figures given in Table II. In contrast, it can be stated that the present cost of maintaining a type 2-8-8-2 Mallet may be taken at 60 cents per engine-mile, without including many miscellaneous charges not shared by the electric locomotive. Possibly more direct comparison may be better drawn by expressing maintenance in terms of driver weight, as in Table IV.

TABLE IV—STEAM AND ELECTRIC REPAIRS ON WEIGHT BASIS

	Steam Mallet	C., M. & St. P. Elec.
Cost of repairs per mile, cents	60	14.65
Weight on drivers, tons	240	225
Cost of repairs per 100 tons locomotive weight on drivers, cents	25	6.52

TABLE V—FUEL COMPARISON, SHOWING STANDBY LOSSES

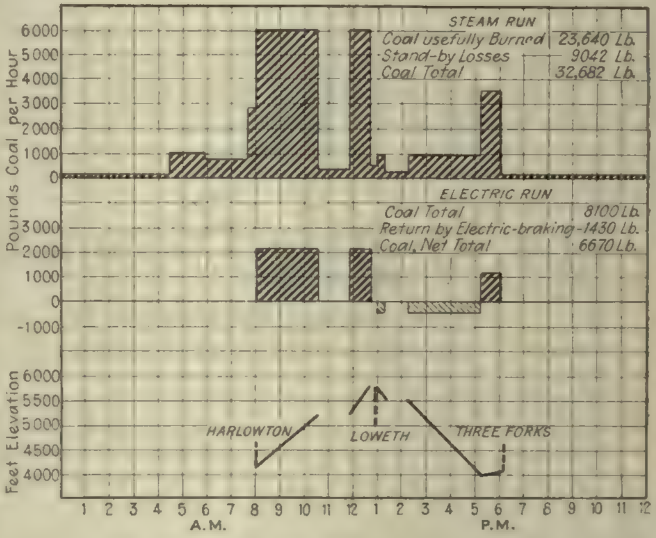
		Steam	Electric
Doing useful work, lb		23,640	8,100
Making up fire, lb	1,535		
Delay at Harlowton, lb	2,270		
Held up at Lennep, lb	394		
Held up at Loweth, lb	128		
Held up at Dorsay, lb	230		
Fire, banked 9 hr., lb	1,425		
Coasting down grade, lb	3,060		
Total standby losses, lb		9,042	
Regenerative braking, lb		......	1,430
Total net coal, lb		32,682	6,670

Including all engine service charges, the facts available give foundation for the claim that electric locomotives of the largest type can be maintained for 25 per cent to 30 per cent of the upkeep cost of steam engines operating in similar service.

FUEL SAVING AS PROMISED BY ELECTRIFICATION

As to fuel saving effected by steam railway electrification, estimates of electric engineers have been called extravagant by steam engine advocates. Fuel economy figured prominently among the reasons leading up to the replacement of the steam engine on the Chicago, Milwaukee & St. Paul Railway as brought out by a careful analysis of the performance of the steam engines then in service.

The following runs are chosen for illustration as bringing out most strikingly the inherent disadvantages of operating a steam engine over a single-track mountain-grade division and handicapped by the usual delays attending freight train service under such conditions: The run of 111.1 miles from Harlowton, elevation 4,162 ft., to Three Forks, elevation 4,066 ft., over the Belt Mountain divide at Loweth, elevation 5,789 ft., was made by steam with 871 tons trailing load in twenty-six cars and by electric locomotive hauling sixty-four cars weighing 2,762 tons. The accompanying diagram shows the results reduced to a common basis of 1,000 gross tons moved, including the locomotive and tender weight. The running speed of the electric train was but slightly higher than the steam and the additional correction in the power demand rate of the former is made proportional to the lower speed. Both runs are therefore shown as made in identical time on the basis of 1,000 total gross tons moved in each instance. The fuel furnishing power to the steam train was 11,793-B.t.u. coal. Electric power was furnished by water and hence no direct coal equivalent is provided by the test result. To afford a common basis of comparison, however, a rate of 2½ lb. of coal per kilowatt-hour is taken as representative of fair electric power station practice. Coal burned under the steam engine boiler was determined by weighing at the end of the run and by detailed record of scoops en route. Power input to the electric locomotive was obtained by means of carefully calibrated recording watt-hour meters as well as curve-drawing volt and



COAL CONSUMPTION COMPARISON ON IDENTICAL RUNS ampere meters. These values of locomotive input were raised to the value of three-phase power purchased, in the ratio given by R. Beeuwkes in his A. I. E. E. paper of July 15, 1920,* and the kilowatt-hours so obtained were reduced to coal equivalent in the ratio of 2½ lb. of coal per kilowatt-hour.

While the electric locomotive demands power only when in motion, the steam engine requires coal during twenty-four hours, whether doing useful work, standing idle or coasting down grade. In fact, the standby losses were such a large percentage of the total coal consumed that a careful record was kept of their several amounts, as may be seen by referring to Table V.

The run of a more modern steam engine would have effected a material reduction in the 23,640 lb. of coal burned in doing useful work, but the amount of coal wasted in standby losses (9,042 lb.) might have been duplicated or even possibly increased with larger grate area. As standby losses constitute so large a proportion of the total coal burned (27½ per cent in this instance) it is apparent that enormous economies over the simple engine tested must be realized in the modern superheater and other improvements since introduced to offset in part the high inherent efficiency of the electric locomotive.

The commonly used unit measurement of pounds of coal per 1,000 ton-miles is at best a very rough and unstable comparison of steam engine runs over different profiles, variable quality of fuel and operating conditions. For example, the data given in Table VI show that pounds of coal per gross 1,000 ton-miles may vary from 650 to 50.5, according to gradient, with no standby losses included. The boiler must always be kept hot, however, and fully 33 per cent can safely be added to the above figures to include the inevitable standby losses inherent to steam engine operation. Except over very long runs with terminals at the same elevation it seems hardly possible therefore accurately to compare engine performance over different profiles by such a variable unit as pounds of coal per 1,000 ton-miles.

A truer understanding of what takes place under the engine boiler may be shown by continuous records of coal burned, tons moved, profile, delays, etc., all reduced to pounds of coal burned per useful horsepower-hour of work done at the driver rims with segregation of the many standby losses, as in Table VII.

Under the same conditions a modern engine would undoubtedly have consumed much less than 9.02 lb. of 11,793-B.t.u. coal while doing work measured at the driver rims. The addition of superheaters gives greater output and economy, while mechanical stokers add output only and, it is claimed, at some expense in economy over good hand firing. However efficient the power plant on wheels may reasonably be developed without too seriously interfering with the sole purpose of the steam engine, the hauling of trains, it can never approach the fuel economies of modern turbine generating stations. Whatever transmission and conversion losses are interposed between power house and electric locomotive are more than compensated for by the improvement in the load factor resulting from averaging the very fluctuating demands of many individual locomotives.

TABLE VI—POUNDS OF COAL PER 1,000 TON-MILES

	2 per Cent Grade	Level Track
Horsepower-hours at driver rims	123	18.8
Indicated horsepower-hours at 80 per cent efficiency	154	23.5
Pounds water per indicated horsepower hour	20	16.0
Pounds water per pound of coal	6	8
Pounds coal per indicated horsepower-hour	3.33	2.0
Pounds coal per 1,000 ton-miles	513	47
Pounds coal per 1,000 ton-miles trailing	650	50.5

TABLE VII—ANALYSIS OF STEAM AND ELECTRIC RUNS HARLOWTON TO THREE FORKS, IN UNITS PER 1,000 TONS MOVED

	Steam	Electric
Kilowatt-hours at driver rims	2,038	2,038
Horsepower-hours at driver rims	2,625	2,625
Coal per horsepower-hour at driver rims, lb.	9.02	*3.09
Credited regenerative braking, lb.	.....	0.55
Standby losses, 27½ per cent, lb.	2.47	.....
Total coal per rim horsepower-hour, lb.	11.49	2.54

*Measured at power house; includes locomotive losses and 32 per cent transmission and conversion loss.

It would be a simple matter to carry through a series of runs over the electrified zones of the Milwaukee with a modern Mikado equipped with up-to-the-minute fuel-saving devices and thus provide the necessary data to draw direct comparisons with the electric locomotive. Such tests with modern steam equipment would undoubtedly discredit the above comparison based upon the economies of six years ago and might lead to something approximating the blend of fact and theory shown in table VIII.

The above table is based upon actual electric locomotive performance, Harlowton to Three Forks, coal taken at 2½ lb. per kilowatt-hour at assumed steam power station. Steam engine values are based upon the known working efficiency of a Mikado equipped with superheaters but penalized with the same standby losses actually determined with a simple engine tested Harlowton to Three Forks. A test run from Harlowton to Three Forks with a modern Mikado engine hauling 1,420 tons may possibly show a lower average fuel rate than 3 lb. per indicated horsepower-hour at drivers less standby waste than 9,042 lb. of coal, but the average annual performance of many such engines would be most excellent if it reached the net figure arrived at of 5.9 lb. of coal per actual horsepower-hour of work performed at drivers. The electric run, however, is being duplicated daily, as to relation between kilowatt-hours and ton-miles, and it is just this reliability of electric operation that may at times give rise to misunderstanding in the comparison of steam and electric data.

In view of all the facts a broad statement may be made that the general adoption of the electric locomotive would probably result in saving fully two-thirds the fuel now burned on present steam engines and possibly one-half the amount of fuel necessary to steam engines of the most modern construction.

TABLE VIII—THEORETICAL COMPARISON OF MODERN STEAM AND ELECTRIC LOCOMOTIVES, HARLOWTON TO THREE FORKS

	Mikado	Electric
Type	2-8-2	4-4-4-4-4-4
Weight on drivers, lb.	240,000	450,000
Weight engine and tender, lb.	480,000	568,000
Tractive effort, 18 per cent coefficient, lb.	43,200	81,000
Trailing tons, 1 per cent grade.	1,420	2,836
Horsepower-hours at driver rims	4,360	8,200
Coal per indicated horsepower-hour, lb.	3	....
Coal per driver, horsepower-hour, lb.	3.75	....
Standby loss, test result, lb.	9,042	....
Standby loss, per horsepower-hour, lb.	2.15	....
Total coal per driver, horsepower-hour, lb.	5.90	....
Coal at power house, per kilowatt-hour, lb.	....	2.5
Coal at power house, per horsepower-hour, lb.	....	1.86
Coal at locomotive driver, per horsepower-hour, lb.	....	3.09
Coal credit due regeneration, lb.	....	0.55
Net coal at driver per horsepower-hour, lb.	5.90	2.54
Total net coal, lb.	24,800	20,900
1,000 trailing ton-miles	157,500	314,000
Coal per 1,000 ton-miles, lb.	158	66.7
Ratio coal burned	2.37	1

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*See issue of ELECTRIC RAILWAY JOURNAL for July 31, 1920, page 227.

The superior operating advantages of the electric locomotive are admitted by many who believe the first cost to be prohibitive, largely due to the necessary trolley construction, copper feeders, substations, transmission lines, etc. Such auxiliaries do add an amount that may equal the electric locomotive expense and the task of proving the electric case is not made easier by the fact that steam engine facilities are already installed and may have little or no salvage value to offset new capital charge for electrification.

Comparing the cost of equivalent steam and electric motive power, it is apparent that on the basis of the same unit prices for labor and material the first cost is approximately the same. While electric locomotives cost possibly 50 per cent more than steam for equal driver weight, the smaller number required to haul equal tonnage may quite offset this handicap, especially with quantity production of electric locomotives of standard design.

The steam engine also demands a formidable array of facilities peculiar to itself, as shown by expenditures made on fourteen railways included in the Northwestern group from 1907 to 1919. This expense covers fuel and water stations, shops and engine houses, shop machinery, turntables, ashpits, etc., and amounted to $42,200,000 as compared with expenditures of $68,000,000 for engines. Proper facilities for rendering adequate steam engine service apparently add some 62 per cent to the cost of the latter.

One of the advantages of electric locomotives rests in the longer engine divisions which they make possible. Considered as a problem of construction only, electrification of a new road may, in some instances, compare quite favorably with the complete first cost of steam engines and all facilities incident thereto. The general problem, however, is one of replacing steam engines now running so that the economic advantages of electrification are rather individual to the particular railway under consideration. The operating economies effected under favorable conditions have been found sufficient to show an attractive return upon the additional capital charge incurred besides providing the improved service which was the main objective in view in replacing the steam engine.

No discussion of electric railway economies would be complete without comment upon the increased value of real estate brought about by terminal electrification. Not only is neighboring real estate benefited thereby, but the "air rights" over the electrified tracks may become so valuable as to largely pay the cost of the change from steam. With the work but partly finished the Grand Central Terminal district is already a remarkable example of the indirect benefits derived from electrification.

A SUMMARY OF THE WHOLE MATTER

Some of the principal advantages claimed for the electric as compared to the steam locomotive may be briefly stated as follows:

1. No structural limits restricting tractive effort and speed of electric locomotive that can be handled by one operator.
2. Practical elimination of ruling grades by reason of the enormously powerful electric locomotives available.
3. Reduction of down grade dangers by using regenerative electric braking.
4. Very large reduction in cost of locomotive maintenance.
5. Very large saving of fuel, estimated as two-thirds the total now burned on steam engines in operation.
6. Conservation of our natural resources by utilizing water power where available.
7. Material reduction in engine and train crew expense by reason of higher speeds and greater hauling capacity.
8. Increased valuation of terminal real estate following electrification.
9. Increased reliability of operation.
10. Material reduction in operating expense due to elimination of steam engine tenders and most of the company coal movement, the two together expressed in ton miles approximating nearly 20 per cent of present gross revenue ton-mileage.
11. Large reduction in effect of climatic conditions upon train operation.
12. Postponement of immediate necessity for constructing additional tracks on congested divisions.
13. Attractive return on cost of electrification by reason of direct and indirect operating savings effected.
14. Far-reaching improvements in operation that may revolutionize present methods of steam railroading.

Unusual Trolley Guard Installation

ON ONE of the Council Bluffs, Iowa, lines of the Omaha (Neb.) & Council Bluffs Street Railway the track crosses at grade a group of thirteen steam railroad tracks, including main-line tracks of two railroads, and at the same time curves through an arc of about 75 deg. The difficulty of holding the trolley wheels on the wire while traversing this curved crossing may be readily appreciated, likewise the necessity to resort to every means available to keep the trolley wheel on the wire. If the car were to lose power at any point of the crossing it would be practically certain to be stranded and consequently would be in a dangerous predicament.

A 507-FT. TROLLEY GUARD INSTALLED ON A CONTINUOUS CURVE OVER THIRTEEN STEAM ROAD TRACKS

In coping with this situation, the Omaha company installed an unusually long stretch of Ohio brass overhead trolley guard. It is 507 ft. long and none of it is tangent. Its installation was a difficult piece of work. Not only was there very heavy traffic on the several steam lines to contend with but the linemen found it difficult to bend the trolley guard sideways and still retain the V-shape. This was done by using bending clamps, which were kept in place while the guard was worked sideways. A ⅝-in. backbone messenger cable was first installed and the trolley guard supported from this, with double pull-offs to hold messenger and trolley wire in proper position over the tracks.

W. O. Jacobi, superintendent of electric lines, reports that this installation is of great assistance.

Responsibilities of Foremen with Reference to Safety*

Good Will and Expression Thereof Must Supplement Rules and Printed Matter in Promoting the Safety Movement Among Employees

By John H. Mallon
Superintendent of Transportation Metropolitan West Side Elevated Railway, Chicago, Ill.

THE importance of the position of the foreman in connection with safety work can hardly be overestimated. Unless the men in positions of authority show an interest in the work we cannot hope to attain the desired end.

When I began railroad work, accidents were looked upon as an inevitable accompaniment of the calling. If a collision occurred and an employee was killed there might be an investigation, but that was usually the end. Little attention was given to changing operating methods, to taking steps to guard against the recurrence of the accident. The workmen became callous and careless, assuming that, according to an old superstition, when one accident occurred two more would surely follow. Happily, however, managers of railways or other properties no longer think that accidents are necessary and inevitable; they have been "sold" on the safety movement in a general way, but I doubt whether all of them realize their responsibility in this field fully.

While my subject has to do with the responsibilities of the foreman, we might go further and point out that the higher officials are responsible for the selection of foremen, and this is a great responsibility. Foremen are often selected because they are competent workmen or because they have been long connected with an organization, without due regard to their qualifications for dealing with the men under them.

The workmen in any organization cannot be better than the foremen under whom they work. They get their ideas of the managment from the foremen. It is highly important, therefore, that the foremen should know the policies of the management with reference to safety work as they must educate the men under them.

It has been my experience that the character of the man at the head of a company is reflected in all of his subordinates down the line. If he is an enthusiast on accident prevention, the organization as a whole will adopt safe practices. While I fully appreciate the splendid work that has been accomplished by safety committees during the past few years, I feel that we can never attain the best results until the executive heads of the various industries show that they have more than a passive interest in our work. It is not enough merely to authorize the expenditure of money for safety committees, for there is the "human equation" to be considered.

In large organizations there must of necessity be a chasm between the chief executive and the workmen, because their duties are of different natures. The chief executive cannot come into close contact with the workmen except on rare occasions, but it is quite possible for him to acquaint them with his policies through intermediaries, such as heads of departments, superintendents and foremen.

In placing new employees, great care should be exercised in acquainting them with all details of their work. The foreman who does not look out for the safety of the men under him is not, in my opinion, qualified for his position no matter how efficient he may be in other directions. We are constantly striving for greater efficiency and increased production, but I hold that real efficiency and safety are inseparable.

The confidence and good will of the employees is the first essential step toward safety. The foreman who cultivates that confidence and good will is a big asset to an organization. I do not undervalue the vast amount of good done the safety movement by printed literature, cards, bulletins, etc., but in my judgment the spoken word is more effective, especially when that word comes direct from the man in authority and is spoken in a friendly way. The printed word may soon be forgotten and the caution sign go unread, but the kindly warning registers every time.

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*Abstract of paper read before Electric Railway Section, Ninth Annual National Safety Congress, Milwaukee, Wis., Sept. 30.

The Urgency of Observing Operating Rules*

Intelligent Selection of Men, Followed by Careful Training, Makes Possible Maintenance of Discipline and Enforcement of Rules

By C. E. Thompson
Assistant to the President Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.

WHENEVER a task is to be accomplished by the united efforts of many, rules must be established to insure team-work. The company with which I am connected issued a book containing some 500 rules governing the employees of the transportation department. These are practically the standard rules used throughout the country and are designed to cover details of electric railway operation.

These rules may be considered in four general classes: (1) Those governing the physical fitness, appearance and personal conduct of employees; (2) those governing the instruction and training of employees; (3) those governing the operation of trains, and (4) those governing the attitude of the employees toward the public.

First in importance, in my opinion, are those rules governing the selection of men, because this is the very foundation upon which an operating organization is built. In selecting men for transportation work it should always be borne in mind that special physical and mental fitness is required.

Having used due diligence in the selection of the men, the next step is instruction and training. It is very important that new employees be instructed by men who are not only experienced and capable but who will see that rules are fully understood and complied with.

Conditions on every railway are changing from day to day, making changes in the rules necessary. It is therefore very important that the old as well as the new employee be examined as to the rules at frequent intervals. Much can be accomplished by having group meetings, where the rules can be discussed and the reasons behind them given.

Again, the employees are points of contact between the public and the company and must, therefore, so conduct themselves that the public will know the aim of the company to be all-round service. The real problem of the electric railway today is so to train its employees that they know the aims and needs of the organization and realize that the company's success is their success and that the company can be successful only when it serves the public courteously and efficiently.

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*Abstract of paper read before Electric Railway Section, Ninth Annual National Safety Congress, Milwaukee, Wis., Oct. 1.

Most delays in service are caused by failure of the human element, orders forgotten or rules broken. Whether the failure results in damage to equipment or injury to passengers, or neither, the delay is serious. Delays to service can be rectified, damaged equipment can be repaired, personal injury claims can be settled, but it is much more difficult to regain the confidence and good will of disappointed and dissatisfied patrons. Popularity of a public utility enterprise can only be retained by efficient service, which in turn requires a religious observance of correct rules by capable, intelligent, trained employees.

Pension Retirement Promised

Beaver Valley Traction Company Makes Provision for Regulating Voluntary and Forced Retirement with Pension

THE Beaver Valley Traction Company and the Pittsburgh & Beaver Street Railway Company, New Brighton, Pa., W. H. Boyce, general manager, have instituted a pension-retirement feature for all employees of the two systems.

This retirement is made on the following basis:

Class "A"—Regular Retirement

All male employees who have reached the age of seventy years, and all female employees who have reached the age of sixty-five years, shall retire from active service.

Class "B"—Retirement at Request of Employee, or at Discretion of Company

All male employees who have reached the age of sixty-five years, and all female employees who have reached the age of sixty years, and whose term of service has been twenty-five or more years, may at their own request or at the discretion of the company be retired from active service.

Class "C"—Retirement at Request of Employee

All male employees who have reached the age of sixty years, and all female employees who have reached the age of fifty-five years, and whose term of service has been thirty or more years, may at their own request retire from active service.

The payment for regular allowances under Classes "A," "B" and "C" shall be as follows:

For each year of his or her term of employment two per centum (2 per cent) of the average annual pay during the ten years next preceding retirement, provided, however, that the company may, at its discretion, base such allowance upon the average annual pay of the ten consecutive years of service during which the retired employee was paid the highest rate of wages. The minimum allowance shall be $25 per month, and the maximum allowance shall not be more than seventy-five per centum (75 per cent) of the average annual pay upon which said allowance is based.

Class "D"—Retirement at Discretion of the Company

Any employee whose retirement on account of advancing years is desirable, or who has become permanently and totally incapacitated or disabled as a result of sickness or injury, other than by accidental injury arising out of and in course of employment by the company, and whose term of employment has been fifteen years or more, may, at the discretion of the company, be retired from active service. If an allowance is granted it shall be for such period as the company may determine, and if at any time during such period the employee recovers sufficiently to resume active service, the allowance may be discontinued by action of the company, if the employee re-enters the service of the company, at the time such allowance is discontinued, the period of absence shall be considered a leave of absence and not as a break in the continuity of the employee's service. The amount and duration of each allowance under Class "D" shall be determined by the company.

It is provided that the decision of the company based on company records shall be final on possible disputed questions of term of employment and payment for service of employees. Many details of interpretation of how years and salaries are figured, of methods of paying allowances, of insurance provisions now in force, etc., are added to the formal statement.

H. O. Allison, safety engineer for the two companies, who has charge of the employment of all trainmen, states that the use of the pension feature as an inducement to the applicant and for the older employee to stay has been most effective. He thinks that men do give consideration to the future held out by the job offered.

In addition to the pension feature these two companies carry a blanket insurance policy covering all employees. These policies pay on the basis of ½ year's wages to dependents in case of death of an employee who has been in service for one year. An employee of two years' service holds a policy calling for the payment of a full year's wages to his dependents in case of his death from any cause. The only stipulation made in these policies is that none shall call for more than $2,400. There is no charge to the employee.

Pacific Claim Agents Meet

THE Pacific Claim Agents' Association held its annual meeting at San Diego, Cal., on Sept. 22, 23 and 24, and the following officers were elected to serve for the years 1921 and 1922: President, Charles A. Blackburn, Butte Electric Railway; first vice-president, John S. Mills, Oakland Terminal Railways; second vice-president, Frank D. Oakley, Tacoma Railway & Power Company; third vice-president, S. A. Bishop, Pacific Electric Railway; secretary and treasurer, B. F. Boynton, Portland Railway, Light & Power Company.

The following were elected members of the executive committee: J. H. Handlon, chairman, San Francisco; T. G. Aston, Spokane; C. M. McRoberts, Los Angeles; A. M. Lee, Seattle; H. G. Windsor, Tacoma, and J. W. Grace, Sacramento.

West Virginia Convention

FOR the first time since the war the West Virginia Public Utility Association became operative when the first annual meeting since 1917 was held on Oct. 5. One of the important decisions reached was to establish permanent headquarters in Charleston and employ a paid secretary. The meetings were held at the West Virginia Engineers' Club.

The following officers were elected: President, Herbert Markle, Bluefield; first vice-president, C. P. Billings, Wheeling; second vice-president, M. Hetzer, Moundsville; third vice-president, E. W. Alexander, Charleston; treasurer, A. M. Hill, Charleston; executive committee: W. P. Rawley, C. C. Bosworth, W. R. Power, H. H. Grimsley, A. C. Babson, H. S. Newton, C. S. McCalla and C. H. Brewes.

The retail price of gasoline in England is now more than 4s per gallon; that is, it is approximately $1 in American money at the normal rate of exchange. Of course the "imperial" gallon is 20 per cent larger than the gallon which is standard in the United States. The *Electric Railway and Tramway Journal* attributes the recent rate increase to rise in ocean freight, increased railway charges, more expensive labor and higher maintenance charges.

Shop, Track, Power and Line

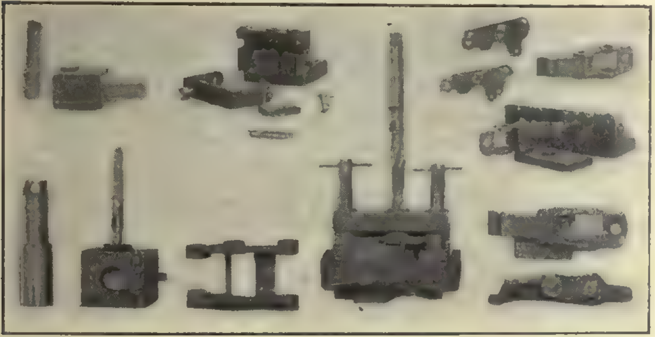
These Articles and Ideas Are From Men on the Job Who Find Special Applications and New Methods an Incentive for Greater Effort — If You Have Something Good Pass It Along

Repairs to Control Equipment

Shop Jigs for Drilling Magnet Plungers and Bushing Worn Contact Levers and Contact Fingers Increase Their Life

IN THE shops of the Wilkes-Barre & Hazleton Railway and the Lehigh Traction Company, Hazleton, Pa., under the direction of James W. Brown, superintendent of shops, jigs have been made up for use in making and repairing the wearing parts of D.B.-131 GE type M control interlock boxes. Accompanying illustrations show these various jigs and the manner in which they are used.

At the left of the illustration is seen the magnet plunger and the jig used to drill the 7/16-in. hole near the end of this plunger. The plunger itself is turned down from soft steel. The jig is made of cast iron and the guide hole for drilling is bushed with hardened steel. A set screw holds the plunger firmly in position for drilling. Plungers have to be renewed due to the wearing of the shoulder and this jig insures that the drilling is properly done.



CONSTRUCTION OF JIGS AND METHOD OF APPLICATION TO CONTACT LEVER, CONTACT FINGER AND CONTACT PLUNGER FOR DRILLING AND BUSHING

The equipment used in bushing and repairing contact levers is shown in the center of the illustration. When the contact lever is worn it is placed in the jig and the hole originally 7/16 in. in diameter is drilled out to 5/8 in. and reamed. Small bronze bushings made up from brake valve stems and other scrap materials are used to bush these holes to the proper diameter. These bronze bushings are turned to a pressing fit on the outside and bored out to 7/16 in. inside and then cut off at the proper lengths. As in the previous case, the jig is made of cast iron, the construction details being clearly shown in the illustration. The guide holes for drilling are bushed with hardened steel. The contact lever is placed in the jig and two set pins are used as illustrated to center the lever in the jig. A clamp is then hooked over two pins on the side of the jig and a set screw holds the lever firmly in place for drilling. Both a bushed and an unbushed lever are shown beside the jig illustrated.

Contact fingers become badly worn and have to be bushed in the same manner as the contact levers. The contact finger is of an awkward shape and is held in a squared position for bushing with difficulty. At the right of the illustration is shown the means used to accomplish this. Two specially constructed angle plates are screwed firmly to the finger, as shown in the illustration. These insure that the finger will remain in a squared position for drilling. As with the contact lever, the original 7/16-in. diameter holes are drilled out to a diameter of 5/8 in. and reamed, following which they are bushed with the same size bronze bushings as are used on the contact lever.

Pumping Corrosive Liquids

THE development of the chemical industry and more refined methods in water treating for power plant work have brought about a demand for apparatus to handle corrosive acid, gases or liquids at different temperatures and under varying amounts of pressure.

The substance which is most generally suitable for resisting the action of corrosive liquids is some kind of siliceous ceramic material, as this can be obtained in any form desired, can be molded and baked and is insoluble in any liquid and unattacked by erosion or by gases. Heretofore, Germany has had the monopoly on this business, but during the war a new acid ware, called "ceratherm," was prepared by the English. Like silicaware, it can be plunged when red hot into cold water without cracking, and its good heat conductivity permits of a rapid equalization of temperature in vessels.

A line of centrifugal pumps made from this material in modified form has been placed on the market for use wherever a pump possessing the qualifications outlined is needed. By special features of design, the material, cemented into iron casings, is protected from excessive mechanical strains and what metal bearings are necessary are protected from contact with the liquid pumped. The range of sizes built by the manufacturers in England, the Guthrie Company, runs from deliveries of 10 gal. to 5,000 gal. per minute.

These pumps have been used successfully for pumping sodium peroxide and other liquids, such as hydrochloric, nitric and acetic acids, both hot and cold.

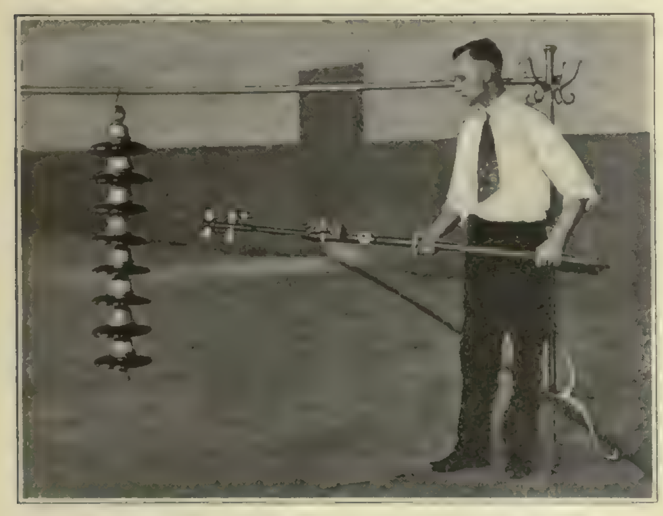
Unique Insulator Tester

Device Which Facilitates the Continuous and Special Inspection of High-Tension Transmission Line Insulators

DEFECTIVE insulators on installed lines are difficult to locate without serious disturbance to service or great expense for equipment. No matter how thoroughly defective units have been weeded out during the winter and spring months, the first few hot days of summer bring failure of insulator units. If the defective units are not immediately located and removed they become a serious menace to satisfactory line operation.

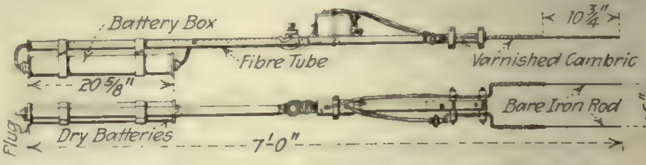
The Mississippi River Power Company has developed a unique method for testing the insulators on its lines which may be of interest to other line operators. This company operates two 110,000-volt transmission circuits, carried on a single tower line 144 miles between Keokuk and St. Louis. On these two lines 87,000 suspension-type insulator units are in service.

Previous to 1915 it was possible to take one of the St. Louis lines out of service during daylight hours on weekdays for megger testing of insulators. The amount of power carried over these two circuits has increased, however, during the last two years to such an extent that at present neither line can be cut out during the week except at night, without reduction of load and resultant loss of revenue. Under these conditions testing which can be done during daylight hours only is limited to Sunday periods. The time necessary for testing the insulators by the megger method was limited by the great number of insulators on the line, and also the megger method for testing insulators gives trouble at night due to dampness. The company then attempted to work out some equipment which would be self-contained in a single-testing outfit which would not require any long wires connecting the test points to additional equipment on the ground. After trying out several schemes, the so-called Keokuk insulator tester was developed as can be seen in the accompanying figures.



METHOD OF APPLYING INSULATOR TEST FORK TO INDIVIDUAL UNITS

Upon the handle of a fork is mounted an automobile induction coil, the high-tension winding of this coil being directly connected across the tines of the testing fork without an automobile spark plug connected in series with the circuit. The low-tension winding of the induction coil is connected in series with three dry cells in a container at the handle end of the fork, and in series with this circuit is a 5-amp. snap switch by means of which the induction coil can be energized during tests. This testing fork is not designed for use on live lines, and any circuit on which tests are to be made must be taken out of service and perfected before the fork is applied to individual units. When the line is ready for test the fork is applied to each unit in an insulator string. If the unit is of satisfactory resistance no discharge occurs across the spark gaps. Whenever the fork is placed across a defective insulator unit which has a low resistance a heavy discharge occurs across the spark gap, and in this way the defective insulator is easily located. Three ordinary dry cells are sufficient for testing several thousand insulator units.



DETAILS OF CONSTRUCTION OF THE TEST FORK FOR TESTING OF INDIVIDUAL INSULATOR UNITS

During the period from June 23 to July 26 of this year 44,000 insulators at dead ends and anchor towers on the Keokuk-St. Louis 110,000-volt line were successfully tested with this device, and 2,087 units, or 4.74 per cent, were found defective and replaced. As many as six testing tools were employed simultaneously during the interval between 10 p.m. and 6 a.m., and an average of between 700 and 1,000 units per crew were tested each night.

The present plan is to provide each of the nine patrolmen, who live at 16-mile intervals along the St. Louis line, with a testing fork. Once each week during the hot weather season each patrolman will test insulators at two anchor towers. In this way any progressive deterioration in insulators will be detected before severe line trouble can develop.

The above information is gleaned from an article by R. B. Howland, *Stone & Webster Journal.*

Efficiently Arranged Forge Shop

Washington Railway & Electric Company Located Its Forge Shop So That It Is Convenient to Iron Rack and to Machine Shop

THE forge shop of the P Street shops of the Washington Railways & Electric Company, Washington, D. C., was laid out with the primary view of efficient handling of materials to and from the forges and was as centrally located as the layout of the plant permitted. The accompanying sketch shows this general layout, together with the location of forges, anvils, etc.

For receiving and storing iron an iron rack was built in the adjacent yards. This is handy to the alley through which the iron is delivered and to the main door of the forge shop. This iron rack is built of horizontal pipe supported by wooden members and is large enough to take a large and varied stock of iron and steel.

The rack is 30 ft. long, 8 ft. high, and 16 ft. deep, and is convenient to the shear and punch, which is

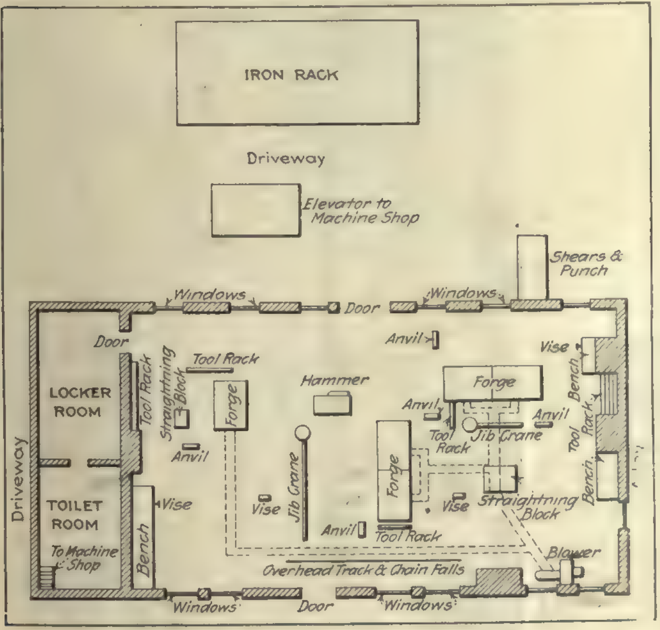
INTERIOR ARRANGEMENT OF FORGE AND BLACKSMITH SHOP

located just outside the shop so as to allow extra long pieces of steel to be cut and punched for use in the forge shop. For convenience in handling finished work, the elevator shown on the layout serves the machine shop and all work from the forge shop to the machine shop is carried this way.

A locker room has been constructed next to the blacksmith shop which is used by the machinists and blacksmiths. This is equipped with 6-ft. lockers. The toilet and washroom adjoins the locker room and is supplied with both hot and cold water. The shop itself is well lighted during the daylight by large windows opening direct onto the street, and at night by 100-watt incandescent lamps.

Five forges located as shown in the sketch are of the Buffalo down-draft type. The draft ducts are laid under the concrete floor and all come together at the blower, which is located as shown in one corner. This blower is operated by a 10-hp., 600-volt d.c. motor. Each forge has a separate draft fan and one 8-hp. motor, which is situated at head of the forge and readily accessible.

The shop is also equipped with a No. 7 Beaudry power hammer and a combined shear and punch, both with independent motor drives. The shear and punch, as already referred to, is located just outside the shop.



PLAN OF BLACKSMITH SHOP OF THE WASHINGTON RAILWAY & ELECTRIC COMPANY

A ½-ton gib crane serves one end of the shop, and here all the heavy forging is done. A smaller gib serves the other end. In addition to this principal equipment other necessary benches, anvils, straightening blocks and tool racks are arranged in convenient locations.

Economies in Car Painting

Methods and Processes Used in Painting Simplified Considerably During Past Few Years—Further Economies Can Be Accomplished

WITH a view of obtaining information on additional economies in car painting that might be possible, the editors of this paper have made some special investigations of the methods used in painting automobiles and methods recommended by paint manufacturers. From the information obtained it appears that a large saving in time can be obtained through the use of a rapid drying filler. Every painter knows that if a perfect job is to be produced it is of the utmost importance to begin with a good foundation. The filler should provide this foundation and should be of such a nature as to eliminate the natural suction that is peculiar to some forms of filler material, and so enable the varnish and body coats to remain in place until natural wear removes them.

The Poughkeepsie Paint Company has placed a filler on the market known as "Filkote." This filler is intended to replace the primer and plastering coats, and two coats of this filler will provide a surface equal to the primer and two plastering coats, a saving of one operation. Carriage and automobile painters in that vicinity have used this product for the past eight or ten years with very good results. The great advantage obtained from the use of this filler is due to its rapid drying. It may be applied at the rate of a coat every twelve hours, and with the employment of artificial drying may be applied as often as every three hours. By doing away with the primer lead and guide coats it cuts down the time required for a job by at least five or six days, and the labor necessary for applying these coats.

Another advantage claimed for this filler is that it does away with the use of water for rubbing and thus eliminates the necessity of waiting for the water used under the old way to evaporate before further work can be done. If the water is not thoroughly evaporated it will cause trouble in the finished job in the form of blisters scaling and the sinking of the varnish coat.

Most railways lay out their painting and varnishing schedule in a systematic manner and along lines which will require the removal of cars from service during periods when they are least needed. In former years it was considered necessary to have a car in the paint shop from two to three weeks while it was being repainted. Under methods which are now used this time has been reduced to approximately ten days on some railways. In pre-war days methods generally used for painting electric cars required one primer coat, one lead coat, three coats of rough stuff, one guide coat, one filler coat, one coat of colored varnish, one lettering coat and one coat of finishing varnish.

The methods now in general use consist, first, of scrubbing the car when it is received in the shop. After the car is thoroughly dry a primer is applied. In general with the usual type of surface car, the scrubbing will take two men approximately ten hours, and it will be necessary to allow the car to dry for the succeeding twenty-four hours before the primer coat can be applied. This priming coat will take approximately seven man-hours, after which the car must stand for drying an additional twenty-four hours. After the primer is dry plastering or glazing is done. This takes one or two coats, depending upon the condition of the car and the surface that is desired. With a car in ordinary condition the plastering would take from five to nine hours' time of a single man, and an additional ten hours would be required for drying after each coat. The car body would then be ready for the body color, after which it could be lettered and varnished. The application of the body color would take approximately fourteen man-hours, the drying twenty-four hours and the varnishing approximately seven man-hours, after which it would be necessary to dry twenty-four hours longer before the car could be returned to service. Many roads are now using enamel paint instead of the body color and varnishing. Where varnish is not used this saves nearly two days' time.

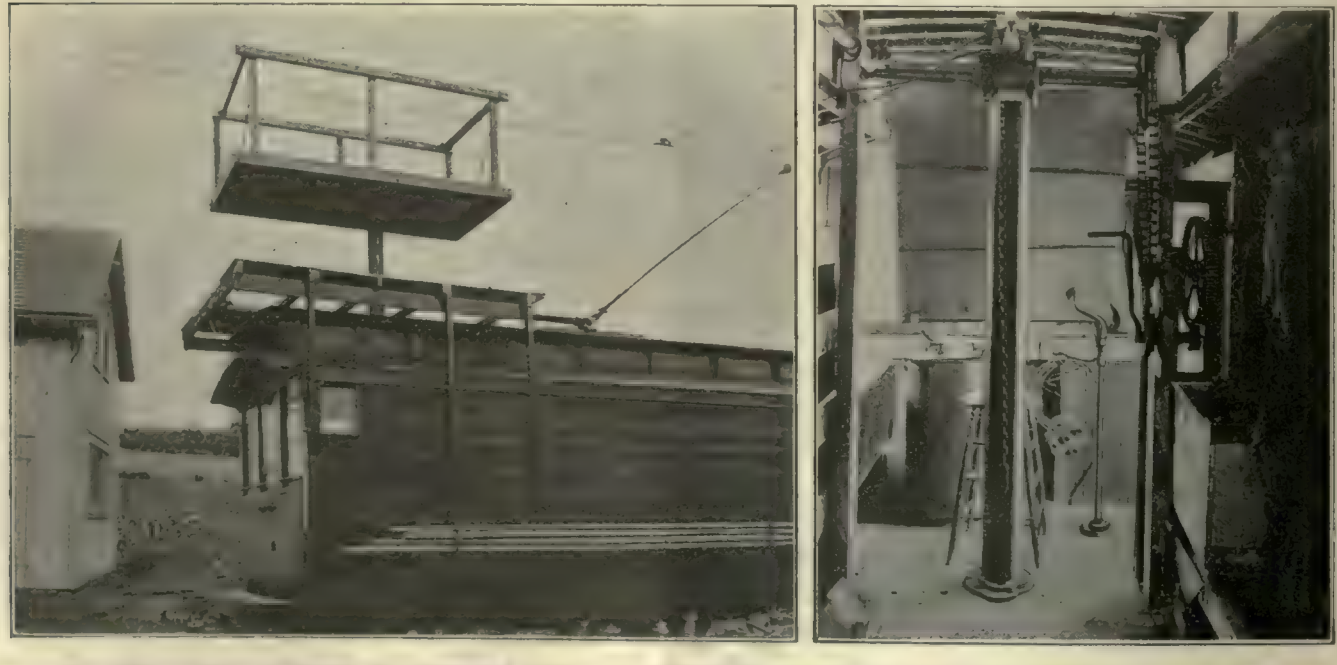
By analyzing the figures just given it is readily seen that a large amount of the time that a car is in the shop is consumed in drying. If this can be shortened the car could be returned to service more speedily. Where an operation can be performed in a week the car could be returned to service for the Sunday traffic. Ordinarily no work is done in shops on Sunday and the painting schedules are usually arranged so that the cars can dry on this day.

As a result of the high prices for paint and oils, the use of cheaper substitutes has received considerable attention. Great interest has been manifest in the use of semi-drying oils and driers in general. As a result of investigations, important advances have been made and some valuable scientific work has been accomplished with reference to the chemical reactions that take place while oils are drying. The question of how and why some metallic salts make an oil in which they have been dissolved dry to an elastic film has not yet been fully answered. This, however, is a very important factor in car painting, as cars in operation are frequently subjected to rapid changes of temperature which will cause the paint to crack unless the film is quite elastic. Under some conditions the oil used will dry with satisfactory speed, but to a tender, cheesy film, which is not serviceable.

An average figure for the revenue of a car under present conditions is approximately $40 per day. When a car is not in operation the greater part of that sum of money is definitely lost. If by employing new methods or different materials for car painting the time of completing a car can be shortened by four days, which it seems probable can be accomplished under favorable conditions, this would mean a saving of approximately $160. In addition to this saving there would be undoubtedly a saving in the labor charges. Neat and well-painted rolling stock adds materially to any operating company, and it is certain to result in increased revenue by attracting riders more frequently who desire clean and comfortable transportation.

Convenient Line Car Platform

ACCOMPANYING illustrations show the general arrangement and working details for a type of line car platform which was constructed by the Northampton Traction Company of Easton, Pa. All the working parts for raising and lowering the platform are installed on the inside of the car. The platform above the car is supported on a post and has a swivel joint where it is attached, so that the platform can be turned to any desired position. Gearing connected to the mast on the inside of the car enables one man to raise the platform to its full height with two men on the platform in less than one minute's time. As at present constructed the platform can be hoisted 7 ft. above the roof, which permits work on line and overhead troughs at railroad crossings which are 22½ ft. high. The platform is 8 ft.

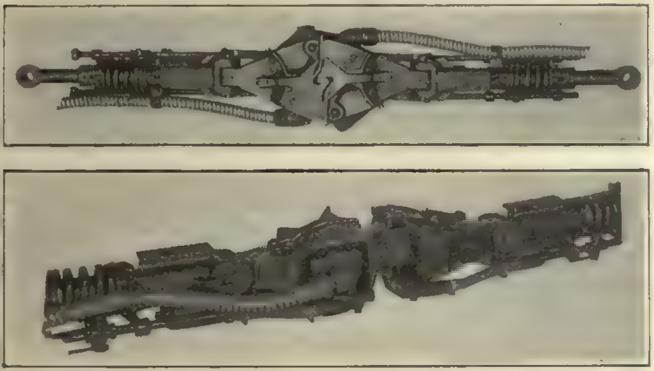


AT LEFT, LINE CAR WITH PLATFORM RAISED. AT RIGHT, INTERIOR GEARING FOR HOISTING PLATFORM x 4 ft. and has a railing 2 ft. 9 in. high, which is hinged so that it will fold down on the platform when not in use. This railing can be readily folded or turned up by hand. The car, together with this platform, was originated by Edward Welch, line foreman of this railway, who will be glad to supply others with additional details of its construction.

Automatic Car Air and Electric Couplers

Safety in Operation and Economy in Maintenance Have Proved an Incentive for Improvements in Car Couplers for Train Operation

TRAIN operation presents many problems which did not exist when cars were operated as single units or even occasionally as motor and trailer. Not the least of these is the means for connecting the cars together. In the early stages of electric railway development the primitive link and pin type of coupler was fairly satisfactory, as at infrequent intervals only was it necessary to operate more than one car at a time, such as the hauling of a light trailer to meet special demands, or the hauling of a disabled car to the carhouse. When, however, two or more cars are operated together regularly the means of connecting them becomes of great importance.



TOP AND SIDE ARRANGEMENT OF COUPLERS

The introduction of the automatic car coupler marked a wonderful advance in train make-up facilities, effecting, as it did, a saving in the matter of time and a reduction in the element of danger involved. However, this left something yet to be desired since manual coupling of the air connections was still necessary. Further progress was made when the Westinghouse car and air coupler was evolved a few years ago. This obviated the necessity for hose connections, but still required the use of separate electric jumpers. Obviously, the ideal condition is that in which all necessary connections between cars, mechanical, pneumatic and electrical, are made automatically.

The coupling of cars together for train operation involves the two important considerations of safety and economy.

The safety element is increased as the element of personal danger in making up trains is eliminated, there being no need for the train crew to go between the cars because the mechanical, pneumatic and electrical connections are all made simultaneously and automatically.

When the couplers are locked together it is impossible accidentally to separate them while the train is in operation due to uneven track, etc. Furthermore, the fundamental idea of the air brake is maintained in that unintentional separating of the cars will produce an emergency application.

If the lock of one coupler should become deranged or defective the other is not affected in any way, and it alone will prevent accidental uncoupling of the cars.

The couplers are of the "tight lock" type and are held together rigidly so that all slack is eliminated, and the train moves as a solid unit without severe shock or possibility of damage to car apparatus or equipment.

From the standpoint of economy there are many advantages. Time is saved because trains may be made up more promptly and congestion at terminals avoided. Delays due to failure of air or electric connections are obviated.

Maintenance is reduced because there is no expense for electric jumper up-keep or replacements and the wear and tear on hose connections is eliminated.

The coupler comprises a cast steel head and draw bar with suitable draft gear spring and an electric portion. The head has a hooked end and recess in its face adapted to engage with the corresponding face of another coupler. Vertical motion is provided where the head is attached to the draw bar and lateral movement at the point where the draw bar is attached to the car. The coupler heads are doubly locked together and become as rigid as a single casting, so there is an entire absence of slack, permitting the train to move as a single unit without shock.

The air connections are brought to outlets at the coupler face and provided with soft rubber gaskets to seal the joints. Thus the pneumatic connections are accurately and reliably made when the couplers are locked. The electrical portion consists essentially of a series of "butt" type contacts which are brought together when the couplers become engaged. These contacts while coming together are caused to rotate in opposite directions, which subjects the surfaces to

COUPLING OF CARS IN SERVICE

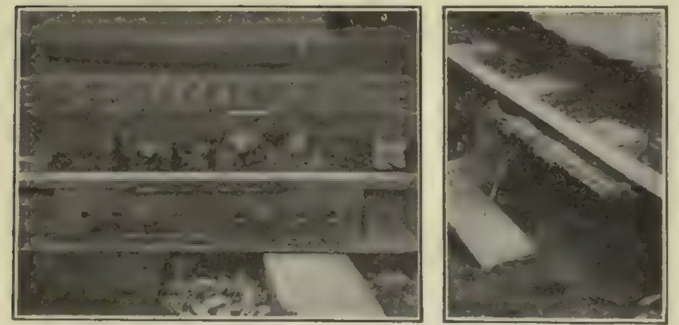
a rubbing action, removing all non-conducting material which may have accumulated and insuring a perfect contact. The contacts are well protected from mechanical injury on the open end of a car.

The K-1-A Coupler is adapted for multiple car or motor and trail car operation in street railway service. It is entirely automatic in the coupling operation, but the uncoupling is manual. The impact of the couplers, one against the other, locks them together and makes the air and electric connections, the operation being completed by manipulation of circuit closing switches and cutout cocks. The reverse movement of switches, cutout cocks and movement of unlocking handles comprises the uncoupling operation. When the coupler part the latch is automatically tripped to locking position, so that they are reset and ready to be couple again without the necessity of further manual action.

The electric portion, consisting of a group of nineteen contacts which permit the use of thirteen separate circuits, is mounted in the face of the coupler. The contact faces are entirely within the contour of the coupler head and being in a cavity back of its projecting nose are well protected from accidental contact with any foreign object. When the couplers meet, and at a point where the gathering and aligning surfaces have engaged, the contacts come together and are compressed by each other against such a spring resistance as, combined with the self-cleaning feature, will insure good contact and provide full carrying capacity without overheating. A rubber gasket prevents the entrance of moisture to the contacts.

Welding Rail Joints to Obtain Flexibility

HAVING experienced a number of broken joints where the fishplates had been welded to the rail for the full length of the top and bottom edges, and also riveted, Charles H. Clark, engineer maintenance-of-way Cleveland (Ohio) Railway Company, came to the conclusion that the joint was too rigid and that it was desirable to weld it in a way that would introduce a certain degree of flexibility. The joints were breaking down completely, that is, the fishplates were breaking in two at the joint. This was caused, it was believed, by the action of the car wheels as they approach and pass over a joint. As the car approaches the rail tends to bend upward at the joint, causing a tensile stress at the top of the plates and a compressive stress at the bottom. Then as the wheels come upon the joint these stresses are suddenly reversed and in the absence of any flexibility there apparently develops a strong tendency to snap the plates.



AT LEFT, MANNER OF WELDING RAIL JOINTS TO SECURE A DESIRED DEGREE OF FLEXIBILITY. AT RIGHT, JIG USED TO SUPPORT FUSING ROD AND TO CUT OFF UNDERCURRENT OF AIR

In October, 1917, a different plan of welding was inaugurated, and since then not a single joint has broken in the manner previously encountered. The new scheme is shown in the accompanying picture. Along the head of the rail the plate and rail are fused or welded together continuously for a distance of 6 in. each side of the rail joint, leaving an unwelded length of about 8 in. at each end of the plate. Along the base of the rail the plate is welded for a 10-in. length on either side of the joint, but leaving a gap at the joint about 3 in. wide, and about a 3-in. unwelded length at each end of the plate.

Plates that are welded in this manner are placed on both sides of the rail and riveted in addition, following the standard joint practice in Cleveland. In the joint shown in the picture the riveting was omitted, since the track under construction was a short piece to permit a by-pass in case of a tie-up and is little used.

The welding of the joint, making use of a Lincoln Electric Company bonding machine, is facilitated by the use of a jig which is braced in position against the joint. This provides a copper surface just even with the top edge of the fishplate and fitting tightly against the plate, on which the soft steel welding rod is laid adjacent to the rail. The copper form on which the steel rod rests prevents the air from coming up around the arc during welding and thereby overcomes the tendency to oxidize and harden the metal.

The jig also includes a rod supported up above the copper form, on which the operator rests the insulated handle of his electrode while welding. This makes it possible to draw an arc of just the right length and then hold a steady flame of uniform length all the way across the weld. The rail, joint plate and soft steel rod are fused together rather than welded in the ordinary sense.

Cast Weld Joints in England

THE cast weld, or Falk joint, as it is sometimes called, has been successfully used in England, according to a recent issue of the *Tramway & Railway World*. A. E. Collins, city engineer of Norwich, is credited with the statement that the Falk joint has been continually used on the tramway system of that city for twenty-two years with very few breakages. Following a description of the process of manufacture of these joints, which is very similar to that now used in this country, Mr. Collins says that in the joints made twenty years ago the cast metal was carried to the top of the rail but it was later thought advantageous to stop it off at a lower level; this has now been abandoned and the previous method reverted to. It is of interest to note that American cast weld joint practice has passed through the same stages.

The rails used were principally those weighing 65 lb. per yard (presumably of the British type of narrow-groove section), but in relaying the weight was increased to 90 lb. per yard.

The Danes recently celebrated the one-hundredth anniversary of the announcement of the discovery of the magnetic effect of the electric current by Prof. Hans Christian Oersted on July 21, 1820. This celebration centers in Copenhagen, where he taught and where he founded a technical college. A statue of the scientist has been unveiled in his native town, Rudkobing, and a memorial museum in Copenhagen is projected.

OLD CROSSING WITH FAILING RAIL JOINTS, BUT WITH GOOD RAIL AND SLOT JOINTS

Thermit Welding for Special Trackwork Repairs

Interesting Combination of Thermit Welding for Rail Joints and Arc Welding for Rail-Slot Joints in Washington

BY R. H. DALGLEISH
Chief Engineer the Capital Traction Company, Washington, D. C.

THERMIT welding for special trackwork repairs is being used by a number of railway companies and has been used by the Capital Traction Company for some time with satisfaction.

Special trackwork for a double-track surface track crossing a double-track conduit track has been recently built by this company in the main shops, using thermit for the wheel rail joints. This special trackwork was built by us for this intersection five years ago, using metal electrode arc welding at the joints. The wheel rail joints failed in the weld, but the joints where the wheel rail joined the slot rail were satisfactory, none of them having failed when the crossing was removed.

One of the accompanying illustrations shows some of the wheel rail joints that failed and also shows the slot and wheel rail joints in good condition. We were compelled to renew this crossing due to the failure of the wheel rail joints and decided to use thermit weld for the wheel rails and metal electrode welding for the slot rail joints, inasmuch as the slot rail joints were satisfactory in the old crossing.

The other illustration shows the new crossing installed with the thermit-welded wheel rail joints and arc-welded slot-rail joints. The crossing is made in four sections and the wheel rails and slot rails are continuous on the conduit track. The wheel rails on the surface track were cut ½ in. short to allow for thermit welding.

NEW CROSSING WITH THERMIT-WELDED RAIL JOINTS AND ARC-WELDED RAIL AND SLOT JOINTS

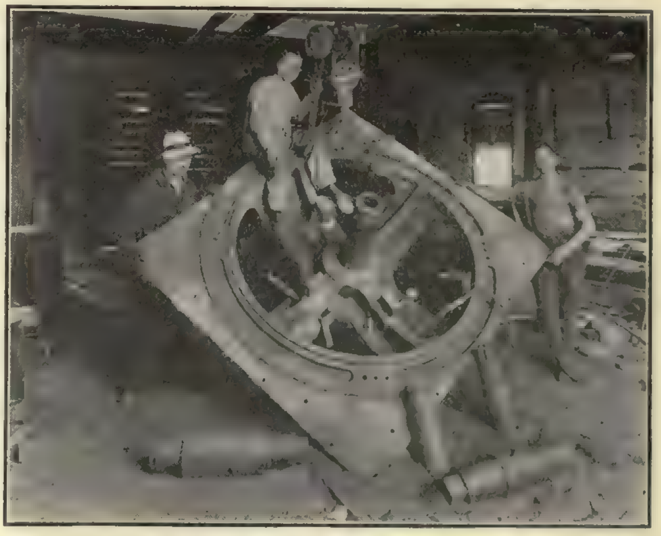
The old crossing was installed on planed head yokes for the conduit track, and as the new crossing was installed on the yokes already in place we were unable to have any thermit metal below the base of the rail. In order to get a good bond at the joint it was necessary to allow the metal to flow under the base of the rail and grind it off before installing the crossing in its permanent location.

In work of this character it is very important that the rails be securely clamped down before the thermit is poured in order to prevent them from twisting out of shape. It is also important that all the care possible be taken, as a very good job in this class of work can be easily spoiled by a little carelessness on the part of the workmen in the fastening of the rails in position.

Repairing an Electric Locomotive Crane Base

THE illustration shows a cast-iron turntable base of an electric locomotive crane which was recently repaired by thermit welding for the Boston Elevated Railway at the Worcester, Mass., plant of the New England Welding Company, of which R. M. Taylor, is president.

The crane base was broken in three places, the average dimensions of each break being 6 in. x 9 in. with a 6-in. opening. The job was turned over to the welders Saturday afternoon and repairs were immediately started on the first break. The first pour was made at 10 o'clock Saturday night. It was necessary to cover the entire casting with a charcoal fire to prevent unequal shrinkage, letting the fire die down and the casting cool before the second weld could be attempted. The job was completed on the following Saturday morning and shipped that afternoon as soon as the casting had become cool enough to handle.



CRANE BASE AFTER WELDING

Thermit to the amount of 940 lb. was used in successfully making the three welds. This repair saved the Boston Elevated Railway many weeks' loss of the use of its electric locomotive crane.

New Method of Lubricating Car Journals

A NEW arrangement for lubricating car journals is being placed on the market by the Horrocks Desk Company of Herkimer, N. Y., in the form of the "Danight Lubricator."

WICK TYPE OF JOURNAL LUBRICATOR

The device as shown in the accompanying illustration consists of four stub brackets which are screwed to the four corners of the journal brass. A circular wick is threaded through the holes in these brackets so as to leave a loop at one end and the two protecting ends at the other end of the journal bearing. After the wick has been installed the brass containing the device is dipped in oil and pushed into the journal box over the journal, leaving the loop end of the wick so that it will pass under the journal and lay in the bottom of the journal box. This method of lubrication may be used as an auxiliary waste lubrication or it may be used independently without waste.

New Asbestos Insulated Wire

THE Independent Lamp & Wire Company, New York, N. Y., announces that it is marketing a new asbestos insulated wire which will be known as Salamander W.E. finish. This is intended for use in winding armature coils, fields and magnet coils for railway equipment. This wire has an insulation coating of pure asbestos free from molecular moisture and treated with compounds and heat in such a way as to make the asbestos resemble rawhide. The manufacturers claim that this wire will withstand extremely high temperatures and that it has high dielectric qualities as well as being impervious to moisture, fire, acid and oil.

New Line of Insulated Cloth

A NEW line of treated cloths for insulating purposes is shortly to be placed on the market by the General Electric Company. The cloths are all woven from long fibered yarn and treated by a special process to remove nap, thus eliminating the possibility of the varnish film being penetrated by the cotton fibers, which would reduce the insulation value. This process makes it unnecessary to starch the cloth to lay down the nap.

All the varnishes used in treating these fabrics are extremely flexible and age well under all operating conditions. By use of special machinery for impregnating the cloth, uniform coatings are obtained.

Yellow varnished cloth is a closely woven cloth treated with a high-grade yellow varnish which is baked in place. It has good dielectric strength and a hard surface film. Two others are yellow oiled muslin and oiled canvas. They are impregnated with insulating oil and oven treated to give them a hard, smooth surface. The linen is used for a large variety of purposes, such as wrapping armature coils, while the canvas is used for pads under railway motor field coils.

Black varnished cloths are very flexible and have longer life under elevated temperatures than the yellow variety. Their oily surface renders them particularly impervious to oil and moisture, and they are preferable wherever a hard surface is not required because of their better insulating qualities. They are of three kinds: First, a black varnished cloth of great mechanical strength, used either as a tape for wrapping armature, field and transformer coils and leads, or as a sheet for wrapping the slot portions of armature coils; second, a duck of a very close weave treated with a black japan of high insulating qualities, and oven cured, and third, a cloth similar to the first except that it is thinner, being used to wrap the slot portion of coils.

All of these fabrics may be put to other uses than those mentioned, it merely being the idea to suggest some applications to which their particular qualities make them especially adaptable.

New Oil Heater

STRAIGHT TUBE OIL HEATER

THE Griscom-Russell Company, New York, N. Y., manufacturers of the Reilly oil heater of the coil type, has recently placed on the market a new oil heater unit of the straight tube type. This is to supplement its coil heater line and is known as the G-R oil heater.

As shown in the accompanying illustration this is designed for the pre-heating of fuel oil before it goes to the burner and to insure complete atomization of the oil and perfect combustion under boilers or in furnaces. The oil is pumped through the tubes and high pressure steam in the shell serves as the heating medium.

The shell of the heater is constructed of wrought steel welded to steel tube plates. The tubes are of seamless drawn steel expanded into tube sheets at either end.

Alberta Engineers Organize

THE engineers of Alberta, Canada, have formed the Alberta Association of Professional Engineers, the first general meeting of which was held at Calgary on July 10. The president of the association is F. H. Peters, commissioner of irrigation and chief engineer Department of the Interior, Calgary, and the registrar and honorary secretary is Prof. R. S. L. Wilson, department of civil engineering, University of Alberta, Edmonton. R. A. Brown, city electrical engineer, Calgary, who succeeded Thomas H. McCauley as manager of the electric railway department, is one of the councilors representing the electrical section.

Final Registration at Atlantic City

AMERICAN Electric Railway Association headquarters reports the total registration for the 1920 convention to have been 3,330. Separate figures for the various associations, manufacturers, guests, etc., were not kept this year. This total registration shows that the 1920 convention surpassed any in recent years, the previous figures being: 1919, 3,166; 1916, 3,271; 1914, 2,454.

There were 136 exhibitors, occupying 59,678 sq.ft. of exhibit space.

Mobile Has Unique Fare Collection

Passenger Drops Metal Ticket in Fare Box, Through Which No Coin Can Fall; Hands Cash Fare to Conductor

FOR several months now the Mobile (Ala.) Light & Railway Company has had in force a 7-cent cash fare and a 6-cent ticket fare. While 86 per cent of the riders are making use of the tickets the company found that with the 14 per cent it was losing revenue and having arguments with the conductors because of passengers withholding one or two of the coins when dropping cash fares into the fare box. It was claimed by the conductors that it was difficult to detect this practice during rush hours when many people were boarding the car in rapid succession at a given stop. The company makes use of the double-check system of registration, the conductors being required to ring up on a clock having two cyclometers all fares and transfers collected. This is supposed to check against the fares registered in the fare box.

In order to overcome these troubles, the company had the tops of the fare boxes changed so that no coin would fall through. The metal ticket which has been in use for several years in Mobile is slightly smaller than a dime, and the new fare box tops were made so that nothing larger than this metal ticket would fall through. The metal pass used by employees is slightly smaller than the ticket. A third metal piece, termed a "slug," slightly smaller than the pass, is also used, as pointed out below, and the fare box mechanism was changed to register on separate dials these tickets, passes and slugs, with a fourth dial for total fares.

Passengers boarding the car with metal tickets simply drop them into the box and pass on into the car. Passengers boarding and paying the cash fare of 7 cents are required to hand the money to the conductor, who in turn drops a slug, representing a cash fare, into the fare box. Should the passenger put the cash fare into the box in error the coins will not drop through and can then be recovered by the conductor and a slug dropped in instead.

The fare boxes formerly were arranged to register nickels or dimes, tickets and metal passes. During the interim while the company was having the fare boxes changed over to handle the three classes of metal tickets a hinged cover was placed on all fare boxes, preventing passengers from dropping their fares into the box. All pasengers were required to hand their fares, of whatever kind, to the conductor, who by receiving the money or ticket in his own hands could prevent passengers from withholding a part of their cash fare and assure, it was thought, that the company would collect the full revenue. The conductor then would lift the lid and drop the coins and tickets into the fare box.

The present system of fare collection was complicated somewhat by the fact that two of the lines of the company extend outside the city limits, where a separate contract with the county calls for a 5-cent fare. That is, a passenger boarding a car and riding between any two points outside of the city limits is required to pay only a 5-cent fare, although the end of the city-fare zone was some distance outside the city limits. To take care of this situation the company had to install another register, on which these 5-cent fares could be tallied in order to keep them separate from the 6-cent and 7-cent rates collected within the city zone. There are only a few of such passengers, so the fact that they are not registered in the fare box is not a serious matter.

Letters to the Editors

Mechanical Department Stores Accounting

THE CONNECTICUT COMPANY
NEW HAVEN, CONN., Oct. 21, 1920.

To the Editors:

Referring to the paper "Mechanical Department Stores Accounting," presented by Thomas Kennedy before the Iowa Electric Railway Association on Sept. 16, 1920, I have been very much interested in reading the paper and particularly interested in the forms as reproduced on page 719 of the JOURNAL of Oct. 9.

The form on page 718, "Not Stores" tag, to mark material not charged to stores account would seem to me to be more or less unnecessary, and I should think, if I understand the situation correctly, that it would be liable to lead to erroneous accounting.

It is my belief that all material should be charged to stores account, or some subdivision of stores account, and unless such material is so charged it would seem that it would be lost sight of. The master mechanic, or any shop foreman, might take some of that material and use it for repairs, or it might disappear from the storeroom entirely without any record being made of it.

In our storeroom accounting practice we have found it advisable to have all stores included in the stores account, or in some subdivision of that account. In that way we never lose track of it, and if it is used without a requisition to the storekeeper our system is such that it is charged to the proper operating account (or if not used, it is charged to the operating accounts) at the close of the year. This is because such material is usually inventoried at the close of the year, and if that inventory is short of the amount shown on the books for the same class of material the previous year, then the difference is charged off to certain operating accounts as are other inventory differences.

Perhaps I have misunderstood the purpose of the tag mentioned. If so, I should be glad to have Mr. Kennedy's correction. Let's have a little discussion as to the advisability of a "Not Stores" tag.

I. A. MAY, Comptroller.

Paper on "Creeping of Railroad Rails"

35 NASSAU STREET,
NEW YORK CITY, Oct. 12, 1920.

To the Editors:

There is about to be issued by the American Society of Civil Engineers a paper of mine, entitled "The Creeping of Railroad Rails." It consists mainly of a compendium of information received through a questionnaire from more than a hundred of the highest authorities on the subject in North America. I greatly desire to have this paper thoroughly discussed; hence, if any railroad man who wishes to discuss it will write me to that effect, I shall send him an advance copy, provided his letter reaches me before my supply of copies is exhausted.

J. A. L. WADDELL,
Consulting Engineer.

Suggestions on the Proposed Use of Movies

Letters Received as a Result of Editorial Suggestion of Sept. 25 Indicate Keen Interest—The Educational Possibilities of This Medium

SEVERAL letters have been received in response to the editorial suggestion in the issue of the JOURNAL for Sept. 25 with reference to the possibilities of the use of motion pictures in electric railway publicity. Space permits the publication of only a few of these this week, but other communications will be published in early issues.

Railway Propaganda Can Form Only a Flash of an Interesting Film

THE METROPOLITAN WEST SIDE ELEVATED RAILWAY
CHICAGO, ILL., Sept. 29, 1920.

To the Editors:

The proposal to tell the story of the electric railways in a film is a valuable suggestion and it only remains for some astute mind to work out how the story can be told so as to interest the average film audience. It must be borne in mind that an audience that pays to be interested will resent anything that is not to its liking, and no matter how great the problem it will not stand for education in the economics of street railways. It might be possible, however, that nine-tenths of a film would be like any other film, interesting and amusing, and just for one flash to work in something illustrating some feature of the street railway problem.

For instance, a real Western drama, with mountains, plains and cowpunchers, etc., and a brief scene in a town or city where the gas company or the street railway company has gone out of business and ceased to function, due to bankruptcy, with the consequent effect upon the merchants of no business and a dead town. Now this scene would only be an incident in order to convey what happens if the utilities cease to function.

BRITTON I. BUDD,
President.

Hopes That an A. E. R. A. Committee May Be Appointed to Study the Idea

INDIANAPOLIS STREET RAILWAY COMPANY
INDIANAPOLIS, IND., Sept. 29, 1920.

To the Editors:

I am thoroughly in accord with the idea of the many advantages that the motion picture plan offers in setting forth to the people the actual facts regarding the present street railway situation throughout the country. The great obstacle that seems to be in the way of accomplishing most excellent results through this medium is the difficulty of working up a set of films which would be sufficiently interesting to the public to draw them to the theater in connection with the regular motion picture scenes and which would in any adequate way tell the true story of the street railway and bring home the vital interest which every one has in the continued operation of the street railways.

There is no doubt that it is quite possible to produce a satisfactory film for some special local situation which may exist in any particular city. But to make a general film that would be descriptive and illustrative of the street railway, its needs and necessities, the dependence of the public on satisfactory street railway service, and depict it in a way that would be clear and understandable would be a most difficult problem. It would require the most careful thought of the ablest men in the industry, but assuming that the proper thought and attention was given, it should not be impossible of accomplishment.

Personally, I sincerely hope that the suggestion made in your issue of Sept. 25 will crystallize in the very near future into definite form, and that a committee of the ablest minds in the street railway business may be selected who, together with some expert in the motion picture business, may work out a general film which will tell the actual story of the street railways to the public, and impress upon it their needs and necessities in such an interesting way that it will convince the public of its vital interest and secure its hearty co-operation along constructive lines.

ROBERT I. TODD,
President.

Expense the Deterrent Feature for Single Company

PACIFIC ELECTRIC RAILWAY
SAN FRANCISCO, CAL., Oct. 14, 1920.

To the Editors:

I have no doubt of the value of using motion pictures provided arrangements can be made with motion picture theaters to carry out the necessary plans. We have used motion pictures in connection with the training of our men and our Pacific Electric reels have been loaned extensively throughout the United States to other companies and in connection with safety lectures. The subject of attempting to reach the public has also been considered, but the expense here on the Pacific coast has been a deterrent feature.

Possibly all the electric railways through the American Electric Railway Association or in some other manner might join together in one campaign which could be carried on throughout the United States. It would require, of course, a conference with the motion picture companies to determine how this could be best done if it be practicable at all.

PAUL SHOUP,
President.

Would Use Travelogue Rather Than Play to Carry Message

"MIDDLE WEST RAILWAY"
Oct. 1, 1920.

To the Editors:

The idea expressed in the items in the Sept. 25 issue of the JOURNAL on the use of motion pictures has so much merit that it ought to, and undoubtedly will, have the early attention of the industry generally. I am not so much impressed with the plan of preparing a scenario of nation-wide appeal as I am with the basic plan of using the medium of motion pictures to present the utility to its public. The attempt to prepare a scenario, however, could not but be helpful and it might prove successful. The street railway business is, truly, a national industry, but its situation varies in the different cities and municipalities. For example, snow removal, taxes, governmental regulation, competition, rates of fare, cost of injuries and damages are each of great importance to some companies and of none to others. Unless the presentation of the industry in the picture were general its use would be limited, and if general, what would be its effect in the various localities? I think I know what the reaction would be on our public if it saw some street railways that I have seen.

On the other hand it could not but be helpful to show people everywhere the service demands of twenty-four hours on a street railway, big or small. Congestion in the Loop District of Chicago, in Campus Martius, Detroit; Brooklyn Bridge; Park Street Station, Boston; Cleveland Public Square; vehicular traffic in the car tracks of Baltimore, Chicago and Pittsburgh; jitneys and automobile competion in Kansas City, Newark or Los Angeles, and interurban traffic at the Indianapolis and Akron stations are some of the things which would bring home to the car-riding public the daily operating burden carried by this industry.

From the above you will observe that I am inclined to use the movie in the form of a travelogue, instead of a play, but we are agreed on at least one thing, and that is, the motion picture ought to be used by the electric railways of the country as an educational medium.

PRESIDENT.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

Progress at Detroit

Municipal Railway Commission Reports on Results Since $15,000,000 Bond Referendum

In its report covering the first six months' activities of the Detroit (Mich.) Street Railway Commission after the passage of the $15,000,000 bond issue to finance the municipal railway planned by Mayor Couzens, the commission enumerates the work done, work under contract, bids authorized and plans ready for execution and assurances from various sources, including the steel mills, that delivery of material needed will be made promptly.

Work Going Ahead

The mileage of tracks already laid amounts to 1.75 miles. Three-quarters of a mile of pavement has been laid, while 3 miles of the first layer of concrete foundation has been completed and the excavation of 7 miles of roadbed completed, all for double-track lines. The advertising for twenty-five one-man safety cars has been authorized and according to a statement attributed to Joseph S. Goodwin, general manager for the municipal system, cars can be procured and will be running on the St. Jean line early next year.

It is reported that during the week ended Oct. 2, which indicates the rate of progress being made, 3,370 ft. of excavation was done, 3,975 ft. of concrete base was laid, 10,070 ft. of second course of concrete was completed, 1,850 ft. of track ballast was placed and 2,650 ft. of paving constructed. The first course of sub-base concrete on the eastern part of the Charlevoix line is finished. The excavation on the St. Jean line between Kercheval and Harper Avenues, including the Shoemaker and Montclair sections, is completed. The Harper Avenue line, on which work by the Detroit United Railway was stopped and construction started by the city, will be completed at an early date.

Commission Completes Organization

The monolithic block type of foundation, in which all the concrete used as foundation, rail supports, and paving bed is in one unit, is considered by the commission to be better than the original type used, and it is estimated that its use will result in a saving of from $20,000 to $25,000 a mile. The depth of the excavation is considerably reduced and the use of steel ties is permitted. Paving between the rails will be asphalt instead of granite block.

Departments have been organized to handle equipment, overhead construction and engineeering construction. The organization, according to Mr. Goodwin, is complete and can be added to and expanded to meet the needs of construction.

Seven law suits have been begun against the commission. Four of these have already been dismissed and one, instituted by the residents of Clairmount Avenue to enjoin the commission from constructing a municipal line on their street, is referred to elsewhere in this issue. One case has been appealed to the Supreme Court. The Detroit United Railway will be given an opportunity to present to the Supreme Court its reasons why Mayor Couzens, the Detroit City Council, the City Comptroller, the City Treasurer and the Board of Street Railway Commissioners should be enjoined from using the public funds in the construction of a municipal railway. An order has also been granted for Mayor Couzens and the city officials to show cause why such an injunction should not be issued. Oct. 19 was set as the date for hearing oral arguments.

In accordance with its policy of doing as much of its own construction work as possible, bids have been asked by the city for apparatus including six gasoline-driven locomotives, 3½ tons each for hauling concrete, and six steam shovels, and ninety V-type bucket cars for dumping concrete. Bids for switches and other special steel track will also be opened in the near future.

Strike in Ohio Settled

The strike of the trainmen of the Springfield (Ohio) Railway has been settled. The men went out on Oct. 1 at the termination of their agreement with the company. The scale of wages under the old arrangement was 43, 45 and 47 cents an hour. The company had been negotiating with the city authorities for an increase in fare from 6 cents to 7 cents. During the month of September the city, instead of granting the necessary relief, amended the franchise providing for workmen's tickets during specified hours of the day on a 5-cent basis. After this action had been taken the company notified its trainmen that an increase in wages was impossible.

The trainmen declined to accept the existing wage scale and went on strike. The city was without service for thirteen days. Finally the City Commission allowed a 7-cent fare without special tickets during the rush hour as the former ordinance had provided. An adjustment of the wage scale was reached with the men on the basis of 53, 55 and 57 cents an hour, other conditions remaining the same.

M. O. in New York

Staten Island to Be the Proving Ground for Mayor Hylan's Five-Cent Ideas —Operation Planned Dec. 1

The Board of Estimate of New York, by a unanimous vote on Oct. 18, approved the contract between the city and the Staten Island Midland Railroad, providing for the operation by the city of the lines of the company for at least one year.

A Profit-Sharing Contract

There were a few modifications in the terms of the contract which have to be approved by Federal Judge Chatfield, but Commissioner Grover A. Whalen announced that he had assurances that the court would approve the plan in its present form. Briefly, the terms of the agreement are that the city is to equip the lines, operate them for six months, standing all the loss and having all the profit, and that during the following six months the company is to share any profits equally with the city. A clause permits either side to cancel the agreement on a thirty-day notice, and power is left with the court to cancel it at any time. This last provision is to cover legal requirements.

To pay the cost of equipment and to operate the lines of the Midland Company and the Silver Lake line of the Richmond Light & Railroad Company, which will also come within the city control, the Board of Estimate appropriated $300,000. It is expected that this will cover all costs, although the city, if it carries out its announced intention of putting operation on the same basis it was before the company quit, will have to acquire twenty cars, and to buy virtually all of the equipment needed for their operation. Commissioner Whalen hopes to have the lines running by Dec. 1.

Lines to Be Operated

The lines to be operated are the Richmond line between St. George and Richmond; the Silver Lake line between St. George and Richmond Terrace via Silver Lake; the Concord line between Port Richmond and St. George and Richmond Terrace and Port Richmond via Concord; the Manor Road line between West Brighton line and the Eckstein Brewery, and the seasonal lines between St. George and Midland Beach and Port Richmond and Midland Beach. The fare will be 5 cents.

The proposal to have the lines operated by the city was referred to at length in the ELECTRIC RAILWAY JOURNAL for Oct. 16, page 840.

Churches Plan Inquiry

Affairs of the Denver Tramway and Causes of Recent Strike to Be Looked Into

Dr. Edward T. Devine, associate editor of the *Survey* and formerly professor of social economy in Columbia University; the Rev. Father John A. Ryan, S. T. D., professor in the Catholic University of America, and Dr. John A. Lapp, managing editor of *Modern Mechanics*, are actively engaged in collecting information for a basis of a report on the Denver Tramway strike and the present situation. They have established headquarters in the Brown Palace Hotel and are working under the Federal Council of Christian Churches, following an invitation extended by a Denver commission of nine ministers and laymen named in August.

GOOD WILL AND JUSTICE SOUGHT

This is said to be the first time that the National Protestant Council of Churches and the National Catholic Council have been associated in such an investigation. The three representatives of the national body have issued a statement as follows:

> The report will attempt to present an unvarnished account of the relations between the tramway company and its employees, before and since the strike; will go as far as necessary into the question of fares and the financial problems of the tramway company which has in Denver, as in other cities, precipitated the question of increasing fares; the subject of public regulation, whether exercised by a state public utilities commission or by the municipal council, and especially into the question of compensation to employees and its relation to the cost of living, as ascertained by official investigations and otherwise.
>
> It is not the purpose of the investigation to try the case and to pronounce judgments, but to assemble the information which will enable citizens to form their own conclusions.
>
> The national bodies are undertaking this study at the invitation of the Denver commission because it is believed that the situation in Denver is typical and that lessons can be drawn from the experience of Denver which will be useful in other communities where similar situations arise.
>
> It is of course the purpose of the churches to promote good will on the basis of justice and fair dealing, and it is in the hope the investigation will contribute to this end, not only in Denver, but elsewhere, that the investigation has been undertaken.

"Plain Dealer" Articles Concluded

The series of articles which has been appearing in the Cleveland *Plain Dealer* on the present situation of the Cleveland Railway has been concluded. In this review several conclusions have been reached. They are as follows:

1—That at least 200 new cars, considerable track renewal, some rerouting of cars, connecting links between existing lines and new lines for the west side, the Coll'nwood district, the Flats, Brooklyn and parts of the Heights are immediately necessary;

2—That at least four new operating stations and two power houses are required to take care of present needs and that any material increase in the load on the system or any expansion must entail a more comprehensive building program;

3—That the improvements and extensions recommended, particularly in regard to the provision of new operating stations and power houses, will reduce both operating and maintenance costs;

4—That while the population of Cleveland proper has grown 150,000 and the number of car riders increased from 375,000,000 to 405,000,000 during the last five years, the system is short 271 cars, no new operating stations have been built and the annual track extension in this five-year period has been seriously curtailed.

5—That at least $5,000,000 is required to carry out the development program recommended by the street railway company and Street Railway Commissioner Fielder Sanders to improve service and bring the system up to immediate requirements;

6—That more than $4,000,000 worth of capital stock, sale of which has been authorized by city council, still remains unsold;

7—That city authorities, company officials and bankers are agreed that the program should be financed by the sale of capital stock rather than by the sale of bonds, preferred stock or Liberty bonds owned by the company:

8—That frequent appeals to company stockholders to buy new stock at par at a time when the company's stock is listed on the market at 93 and when other securities can be bought to produce a higher rate of return than 6 per cent have not been successful;

9—That unless new capital is raised not one new car can be purchased nor a yard of new track laid and that the present intolerable situation must get worse instead of better.

In the main the report goes on to say that the street railway problem in Cleveland is in the hands of the citizens themselves but that not one of the "improvements, betterments or extensions" imperatively necessary can be provided without additional capital.

City's Representative Wants P. R. T. to Expand

Colonel Sheldon Potter, the city's representative on the board of directors of the Philadelphia Rapid Transit Company, on Sept. 24 demanded that the company be forced to take steps looking to the future growth of the city. He said that the city was developing in a northerly direction, while the company was confessing its inability to construct the absolutely necessary extensions.

He stressed the underlying company rentals and expressed his opinion that rentals could be reduced. Everything, he said, depended on the valuation now being compiled before the Public Service Commission.

Colonel Potter was recently asked to appear before the transportation committee of Council when that body conducted its public hearing on the straight 5-cent fare. He then prepared a statement outlining his views and emphasizing the need for the company to make extensions, etc., that would take care of the transit development of the city. He is reported to have said:

> I am absolutely opposed to the city taking any action that would merely continue the present status quo in the transit situation. The company is entitled to all of its legal rights, but the city is likewise to be protected. We will not wreck the company, but it is appealing to us to save the company from bankruptcy.
>
> The city has given the right to our streets to the Philadelphia Rapid Transit and now that company is in the position of preventing other companies from doing that which it apparently cannot do—develop the city. The situation is very critical and important to the city's future. The company says it is on the verge of bankruptcy and needs a higher fare to save it. But it says nothing of using that money for extensions or improvements. The entire proposal merely temporizes and delays the day of reckoning.
>
> I feel that the company, as the party most affected, ought to enter the suit against the rentals and fight them in order to save itself. Then the situation would be clarified and the company enabled to do that which it is morally bound to do—give the people adequate facilities to enable the city to develop to the utmost.

Authority in Commission

Alabama Legislature Vests Public Service Body with Authority Over Rates and Franchises

All power to regulate public utilities was taken away from the cities of Alabama by the Legislature at a special session which ended on Oct. 2. The Alabama Public Service Commission, under a bill adopted with the support of the Governor and of the commission, was granted the exclusive right to regulate the rates of utilities and to govern all contracts and franchises. The City Commission of Birmingham and others vigorously opposed the bill.

RATE PETITIONS FILED

Since the adoption of the bill a petition for a 37 per cent increase in rates in Birmingham and for increases of from 20 per cent upward in other Alabama towns has been filed by the Southern Bell Telephone & Telegraph Company. The Birmingham Water Works Company has filed a petition for an increase and asks a revaluation of its property and that rates be fixed, which will give the company a fair and equitable return on its investment.

As yet the Birmingham Railway, Light & Power Company has not filed a petition for an increase, but it is expected that such a petition will be filed.

Under the terms of the bill as adopted by the Legislature even present existing contracts with utilities are affected and can be modified or changed by the Public Service Commission. In short, the commission is given exclusive right to fix rates and to govern all franchises and contracts between public utilities and municipalities of the State.

Further Canadian Hydro-Radial Commission Evidence

At a further sitting of the Ontario Hydro-Radial Commission in Toronto on Oct. 14, Chief Engineer Gaby of the Hydro-Electric Power Commission continued his evidence with respect to the Toronto to St. Catharines lines. It was stated that the Canadian Pacific steam line carried more than 80 per cent of the Toronto-to-Hamilton traffic because it ran a non-stop service over the Grand Trunk right-of-way and its station in Hamilton was centrally located. The hydro-radial line was estimated to carry 355,000 passengers a year, with an hourly service, making the time between the two cities in one hour for the 40 miles.

The revenue returns from the London & Port Stanley Railway, now operated by the Hydro Commission, were submitted, showing $24,000 a mile a year, the highest in Ontario. The Toronto & York Radial earned $10,000 to $12,000 per mile serving a population outside of Toronto of 20,000.

Mr. Gaby explained the report of W. S. Murray, New York electrical engineer. The estimated cost for the Toronto to St. Catharines line was $22,000,000.

New York Being Throttled

Head of I. R. T. Points Out How City's Short-Sighted Fare Policy Hampers Future

Frank Hedley, president and general manager of the Interborough Rapid Transit Company, New York, N. Y., says that nothing is more significant to New York in its rapid transit needs than the decision of the Public Service Commission of Pennsylvania authorizing a 7-cent fare in Philadelphia with a continuance of the existing 3-cent charge for transfers. In this connection he points out that New York is now the only large city left in the United States where the policy of preservation and expansion of transit facilities has not been followed. In no other city, he says, is the need for increased transit facilities so great as in New York.

2,000,000 PASSENGERS A DAY

The original subway in New York was opened sixteen years ago. The Interborough subway alone is four times as big as the original subway, but it is still overcrowded. The original subway was built to carry about 400,000 passengers a day. It was gradually increased in carrying capacity until 1,000,000 passengers a day were being handled. The present Interborough subway is carrying more than 2,000,000 a day. The only relief is more subways. Mr. Hedley says:

> Transit Construction Commissioner John H. Delaney made public on Sept. 24 a report by Chief Engineer Daniel L. Turner of the Public Service Commission, submitting for discussion a plan for the construction of about 830 miles of single-track rapid transit lines. It contemplates a twenty-five-year program of construction and a cost at present day prices of about $350,000,000, not covering, however, equipment, interest during construction, or engineering and superintendence. This is an official recognition of the need the Interborough Rapid Transit Company has pointed out on numerous occasions.
>
> The report does not explain how the money for the project is to be obtained. The report states that the operators of the lines would be required to equip them. Equipment cost would at least equal one-half the construction cost. The operators certainly could not raise $175,000,000 new money until their credit shall have been restored by an adequate fare. The way to get more subways is to make the present system self-supporting and investors will then furnish capital for new subways. On a 5-cent fare the city is obtaining no return on its present subway investment and until it does it is too near the constitutional debt-limit to finance the project for this gigantic system. As a 5-cent fare is not profitable the inducement for investors to furnish the funds is not made clear.
>
> The city is groaning in the anticipation of a budget in excess of $350,000,000. This is directly tied up with its policy as to fares. As the 5-cent fare is insufficient to give the city any return whatever on its present subway investment, it has to meet the interest on its subway bonds by taxation, which will amount to about $13,000,000 as soon as the present subway system is all completed and in operation. This increases the tax rate, which, in turn, increases rents and prices.

Additional Bus Permits Denied

The City Commissioners of Pasadena, Cal., have denied the applications of jitney bus owners to operate additional buses in the city until the Commissioners decide upon a fixed policy in regard to the regulation of jitneys.

The city will not allow the expansion of jitney lines within the city limits. It is pointed out by the City Attorney of Pasadena that sooner or later Pasadena must decide on a single form of local transportation.

The installation of the one-man car by the Pacific Electric Railway will doubtless lessen the increase of jitney bus competition in Pasadena.

Co-operation Urged Between City and Utility

Edwin F. Sweet, assistant secretary of commerce and vice-chairman of the Federal Electric Railways Commission, expressed himself in favor of "friendly co-operation between the company and the community" in an address before the Grand Rapids Rotary Club on Oct. 5. Mr. Sweet said in part:

> The practice of many cities, for instance, of forcing the street railway to pay for the paving between the tracks, to my mind, is an outrage. I would distinguish between the car rider and the rest of the community, for now the street car is the poor man's means of conveyance and he is forced to bear the burden of the other fellow when he must pay the company a fare high enough to meet all such burdens placed upon the company, whereas the entire community should help share the expense.
>
> No profit should be made by private individuals in the operation of public utility companies beyond a fair return on their investment. Whatever profit is produced beyond a fair compensation should be reflected in a reduction of fares, into the car rider's pockets.
>
> However, the period of antagonism to street railway companies is fast approaching the end. A period of better understanding is on the way and the problem will be solved with justice to all concerned. God grant that that time shall soon come.

Power Consumption Curtailed

Large users of industrial power supplies from the lines of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., have announced that they will reduce their power consumption by approximately 20 per cent. This action follows a recent appeal by the company in which the latter stated that, owing to shortage of power, the city was threatened with interruption of electric railway service.

Courtesy Pays

George I. Plummer, superintendent of traffic of the Dallas (Tex.) Railway, contributed some hints to transportation employees to *Partners* for September, published in the interest of the employees of the company. On the matter of service he said:

> Service is a commodity we are selling to the public. Are we selling the best and most efficient service? Or are we just getting by?
>
> To give first-class service, we must be attentive to our duty and courteous at all times. We are often called upon to do things not necessarily in the line of duty; we are often called upon to perform a disagreeable task; we are often called upon to deal with unreasonable passengers.
>
> The courteous man handles these situations and disposes of them without difficulty. The discourteous, "hard boiled" species sooner or later gets into trouble and spends most of his time working up excuses in order to account for his action.
>
> This latter type is considered undesirable for this class of work and his services are not wanted, while the other type finds many opportunities to perform real service and to advance in the employ of the company. The opportunity is here for advancement and the ambitious fellow who is always doing the right thing and trying to help out will have no trouble in getting along.

Detroit Injunction Denied

Residents Defeated in Attempt to Restrain City from Building Railway on Certain Streets

Judge William B. Brown, Grand Rapids has ruled against issuing an injunction asked by the 110 Clairmount residents to restrain the city of Detroit from building a municipal railway on their street. The ruling was made on the ground that no detailed plans had yet been made for the construction of the municipal line. The information was conveyed to Bernard F. Weadock, attorney for the Clairmount residents, and Corporation Counsel Clarence E. Wilcox before the court completed its opinion or reduced the decree to writing. It was held that the majority of the voters must be observed, and any change the voters might desire could be obtained at a later election.

SINKING FUND DECISION RENDERED

An opinion similar to that handed down by Judge Mandell was handed down by Judge Brown in ruling on the right of the Sinking Fund Commission to purchase street railway bonds. Judge Mandell refused to issue the injunction asked by the Detroit United Railway when it sought to enjoin the sale of the railway bonds to the Sinking Fund Commission, in order that the case might have an early hearing before the Michigan Supreme Court.

Because the issues were considered of such great importance to Detroit, Judge Brown decided that the local judges should be acquainted with the proceedings and accordingly he invited opinions by Wayne County Judges and suggested they hear the arguments on the case if they desired. The judges concurred with his opinion in the case.

Corporation Counsel Wilcox and a special attorney for the city of Detroit appeared before Judge Mandell asking that the case be reopened because facts had changed which were true previous to the suit.

BONDS DISPOSED OF

The city Sinking Fund Commission has disposed of the most of its holdings of 5½ per cent public utility bonds named in the bill of complaint when the suit was started by the Detroit United Railway. More than $1,500,000 of bonds have been disposed of to investors. It was stated that the practice of selling bonds to the Sinking Fund Commission has been of value to the taxpayers in that it allowed the city to save money which would be lost if the bonds were sold at a sacrifice to private investors. According to Mr. Wilcox, no further difficulty will be experienced in disposing of as many of the street railway bonds to investors as it is desired to issue.

It was held by Judge Mandell that he could not with propriety reopen the case. A later date was set for a hearing between the city and the Detroit United Railway on the return entered by Corporation Counsel Wilcox.

Wage Rise in Vancouver

A new wage scale effective on Oct. 1 has gone into effect on the lines of the British Columbia Electric Railway, Vancouver, B. C. This was the result of an offer made by the company which the men accepted. The men originally asked for 75 cents an hour, but the company offered an advance of 5 cents, making a maximum of 65 cents on city lines. The new wage scale for the various classes of work is as follows:

Motorman and conductors, 65 cents; interurban motormen and conductors, 67 cents; car repairers, 70 cents; mechanics' helpers, 65 cents; car cleaners, 58 cents; carpenters, 77 cents; blacksmiths and machinists, 80 cents; trackmen, 60 cents.

Mexico Men After More Money

It is asserted by the Mexican Tramways, Ltd., City of Mexico, that should the demands of the employees of that company for another 25 per cent increase of their wages be granted it would add 1,200,000 pesos, or approximately $600,000 in American money, to the annual pay roll.

In a statement which it has issued to the public the company claims that it is actually losing 250,000 pesos a month at the present time and that its financial affairs are in critical condition. The demands of its employees since 1914 have been excessive, it is pointed out. During the last six years the total sum paid out in wages each year has increased from 2,044,000 pesos to 6,250,000. This, with the 1,200,000 that is now being asked, would bring the total annual pay roll up to 7,812,000 pesos.

It is on account of the alleged unreasonable demands of its employees and the losses incurred by the company during the long revolutionary period that the company opened negotiations for the sale of its property to the Mexican government. Whether this transaction will be finally consummated is not known. Representatives of the Canadian banking interests that control the Mexican Tramways, Ltd., are now in the City of Mexico.

Vote Proposed on City Ownership

The City Council of Ottawa, Ont., has decided to recommend that plebiscites be submitted to the electors entitled to vote on money by-laws at the next annual election, to be held in January, on the following questions:

1. Are you in favor of the city applying for legislation enabling it to borrow money without a further vote of the electors to acquire the property and assets of the Ottawa Electric Railway under the agreement between the city and the railway at a price fixed by arbitration as provided by the agreement? And in the event of the question being answered in the affirmative, that legislation be applied for conferring the necessary borrowing powers.

2. Are you in favor of the city applying for legislation to provide that the city will not be compelled to acquire the property and assets of the railway pursuant to the agreement between the city and the railway unless a by-law setting out the amount of the arbitration award shall first be submitted to and receive the assent of the electors entitled to vote on money by-laws, or for such plebistice as in the opinion of the city solicitor will carry out the intention of this motion?

News Notes

Strike on Alabama Line.—Union carmen in the employ of the North Alabama Traction Company, Albany, Ala., went on strike on Oct. 5. Service on the company's lines was completely tied up. The men demanded an increase in pay.

New Agreement Being Prepared.—The union employees of the Virginia Railway & Power Company in Norfolk, Portsmouth, Petersburg and Richmond drew up a contract on Sept. 13 in Richmond which sets forth the working arrangements and wage agreement to be asked of the company. None of the terms have been made public.

Consideration of Franchise Proposal Put Off.—Consideration of the petition of the Virginia Railway & Power Company, Richmond, Va., for a general franchise in lieu of the group of franchises under which the company now operates was deferred to a later date at the meeting of the committee on streets of the Council held recently.

Fares an Election Issue.—The Labor party of Winnipeg, Man., is opposing the higher fares granted recently to the Winnipeg Electric Railway. It is making the controversy an election issue. The platform is confined solely to the election of a Council pledged to the establishment of a municipal motor bus service to reduce transportation to a reasonable basis and a demand that the company live up to its original franchise or surrender the same to the city.

Would Abandon Findlay Lines.—The Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, has appealed to the State Public Utilities Commission for permission to abandon service on its Findlay city lines. The use of automobiles by townspeople is said to have reduced passenger business in the small city to a minimum. Nov. 12 is set for hearing at Columbus. The Findlay City Council recently repealed an ordinance granting the company increase in fare from 5 cents to 10 cents.

Conciliation Board Suggests New Wage Scale.—The State Board of Conciliation has recommended to the Railroad Commission of Wisconsin that all trainmen of the Wisconsin Railway Light & Power Company operating in La Crosse, Wis., should be granted wage increases. Under the new pay scale recommended employees of three years will receive 58 cents an hour, two-year employees 56 cents an hour and first-year employees 55 cents an hour. The Railroad Commission will hold a hearing on the recommendation of the State Board of Conciliation.

Will Take Up Case of One-Man Cars.—William D. Mahon, president of the Amalgamated Association, is expected in Boston soon to take up with the executives of the Eastern Massachusetts Street Railway grievances of the men in relation to the operation of the one-man cars. In consequence of dissatisfaction among the men over the one-man cars and the alleged wholesale lay-offs that have occurred since their inception and the establishment of the new wage schedule a few weeks ago, William J. Murphy, chairman of the joint conference board of the unions of the men, sent a telegram to President Mahon urging him to come to Boston at once. Mr. Murphy said nearly 1,000 men have been laid off within the last few weeks. He says this is due in part to the operation of the one-man cars and the new system of curtailment that is being followed out by the executives of the company since the men's maximum wage was increased from 51 to 63 cents an hour.

Akron Ordinance Awaits Review.—The proposed contract between the city of Akron, Ohio, and the Northern Ohio Traction & Light Company for the future operation of the railway system in the city is completed and awaits the final review by E. E. Brownell, the traction expert employed by the city to assist in working out the details. Mr. Brownell is engaged in other work at this time but is expected in Akron shortly to complete his work. As has been stated before, the proposed ordinance provides for service-at-cost, with the city assuming full control. A public utilities commissioner is to be appointed to represent the city and there is a limit placed upon fares. The ordinance provides for the establishment of auto bus lines. It provides also for the purchase or lease of the city system when the city so desires. In fixing the valuation only the physical property used and useful in the operation of the city system is to be taken into consideration by the appraisers. Matters under dispute are to be submitted to arbitration.

Program of Meeting

American Society of Mechanical Engineers

The 1920 annual meeting of the American Society of Mechanical Engineers will be held in the Engineering Societies Building, New York City, from Dec. 7, through Dec. 10. Sessions will be held on the subjects of appraisal and valuation and the application of engineering to woodworking.

The newly-founded professional sections on management, power, fuels, machine shop, railroads and textiles will also conduct sessions to consider the vital problems in their field. In addition to the above a number of valuable papers will be presented at general sessions.

A memorial session for Dr. Brashear is planned, as a fitting tribute to his life and work.

Financial and Corporate

Gross Earnings Increase

Gross Earnings Advance 12 per Cent, but Net Income of Interurban Is Decreased 20 per Cent

The annual report of the Chicago, North Shore & Milwaukee Railroad for the year ended Dec. 31, 1919, shows an increase in gross earnings of $337,946, but a decrease in net income of $103,240. The operating revenue for 1919 increased to $3,237,921, or 11.7 per cent. In 1919 the operating expenses were $2,319,464, as compared with $1,856,038 in 1918, an increase of $463,426, or 25 per cent. The net operating revenue decreased by 12 per cent, from $1,043,937 in 1918 to $919,457 in 1919. The taxes decreased about the same percentage. Due to an increase in non-operating income, the gross income decreased by only 11 per cent from $867,585 in 1918 to $773,235 in 1919. Net income transferred to profit and loss showed a decrease of $103,240, or 20 per cent, changing from $535,079 in 1918 to $431,839 in 1919.

The increase in the gross earnings was recorded in the face of a very large decrease in traffic which the company had enjoyed in connection with the Great Lakes Naval Training Station and other government activities along the North Shore. The decrease in net income was caused largely by increases in cost of labor and material. Increased wages effective on Aug. 1, 1919, amounted to $300,000 per annum.

INCOME STATEMENT—CHICAGO, NORTH SHORE & MILWAUKEE RAILROAD

Year ended Dec. 31	1919	1918	Percentage change
Operating revenue:			
Passenger and special car revenue	$2,951,618	$2,678,693	+10.2
Freight and express revenue	219,397	151,729	+30.9
Miscellaneous revenue	66,906	69,553	—3.8
Total railway revenue	$3,237,921	$2,899,975	+11.7
Operating expenses:			
Way and structures	$306,524	$302,525	+1.3
Equipment	262,922	172,183	+52.7
Conducting transportation	923,913	650,042	+42.2
Power	351,011	354,173	—0.9
Traffic	56,223	35,100	+60.2
General and miscellaneous	418,871	342,015	+22.5
Total railway operating expenses	$2,319,464	$1,856,038	+25.0
Net operating revenue	$919,457	$1,043,937	+12.0
Taxes assignable to railway operation	163,101	185,822	—12.2
Operating income	$755,356	$858,116	—12.0
Non-operating income	17,879	9,469	+88.8
Gross income	$773,235	$867,585	—11.0
Deductions from gross income	341,396	332,506	+2.7
Net income transferred to profit and loss	$431,839	535,079	—19.5
Surplus at beginning of year	855,812	320,733	+166.8
Surplus adjustment	16,697	....	....
Surplus at end of year	$1,270,954	$855,812	+48.5

Service Suspensions Authorized in Brooklyn

Federal Judge Mayer on Oct. 16 granted the request of Lindley M. Garrison, receiver of the Brooklyn Rapid Transit Company and its subsidiaries, for authority to suspend indefinitely operation of nine surface lines which Public Service Commissioner Lewis Nixon recently directed him to operate for the convenience of the public. The lines are the Ocean, Rogers, Church and Park Avenues and the Thirty-ninth Street-Coney Island lines, operated by the Nassau Electric Railway and the Metropolitan and Wyckoff Avenues line and the Ralph Avenue shuttle of the Brooklyn, Queens County & Suburban Railroad.

Mr. Garrison, in his communication to Judge Mayer, stated that the lines of the Nassau system were losing $103,000 a year and those of the suburban system $400,000, exclusive of taxes and other charges. All of the other lines of the companies, he explained, were barely making operating expenses and if they were forced to carry the burden of these lines' deficits all would have to suspend, thus depriving the Brooklyn public of the limited service now supplied.

Judge Mayer said that if Commissioner Nixon would consent to a suspension of transfers on the Church Avenue line and to the substitution of a shuttle service for the Thirty-ninth Street-Coney Island line, these roads might speedily resume operation. None of the lines, with the exception of the Rogers Avenue line, has been operated since the recent strike.

The roads that it is proposed to abandon total about 65 miles of track.

The proposal has aroused much opposition on the part of residents served by the Church and Ocean Avenue lines.

Municipal Road Does Well

Small City Road in Florida, Purchased from Receiver, Has Net Operating Profit of $17,233

For the first year of municipal operation ended June 30, 1920, the railway system of St. Petersburg, Fla., shows a net operating profit of $17,234. While this was not enough to cover interest and sinking fund charges, the showing is regarded as a good one. The total receipts for the year were $93,168. The operating expenses were $75,934.

STATISTICAL INFORMATION — MUNICIPAL RAILWAY OF ST. PETERSBURG

Year ended June 30	Municipal Ownership 1919-20	Private Ownership 1918-19	Percentage Change
Total passengers carried	1,802,739	1,383,742	+30.3
Total passenger fare receipts	$89,303	63,585	56.2
Total car-miles	459,413	406,863	+12.7
Total car-hours	43,744	35,838	+22.0
Average car speed (m.p.h.)	10.50	11 35	—7.5
Average passenger fare receipts per car-mile (cents)	19.417	15.603	+24.4

The railway consists of approximately 26 miles of track. It was formerly owned by the St. Petersburg & Gulf Railway. This company went into the hands of a receiver, and the city was notified that service would be discontinued and the system sold as junk. Rather than lose the service of the railway, the city took charge of the operation of the system on July 1, 1919. A bond issue of $250,000 was voted. The railway was purchased for $175,000, about $75,000 being left for new work.

INCOME STATEMENT
MUNICIPAL RAILWAY OF ST. PETERSBURG
Year Ended June 30, 1919

Passenger fares	$89,303
Freight revenue	3,865
Total operating revenue	$93,168
Maintenance of way and structures	10,347
Maintenance of equipment	11,879
Power	14,853
Conducting transportation	31,420
General and miscellaneous	7,465
Total railway operating expenses	$75,934
Net operating revenue	$17,234
Loans from bondholders and city	4,777
Proceeds from bond sale	263,479
Sale of equipment	634
Total non-operating income	$268,890
Gross income	$286,124
Deductions from gross income:	
Purchase price to bondholders	$179,660
Improvements to overhead construction	9,490
Improvements to track and roadbed	14,007
Improvements to buildings	64
Improvements to rolling stock (new cars)	44,868
Real estate purchases	1,020
To Booker Creek bridge and various improvements	8,500
Contingent improvements	210
Back taxes	5,972
Refund of loans	4,777
Interest on bonds	6,875
Total non-operating expenses	$275,443
Balance on hand June 30, 1920	$10,681

The old equipment was used most of the year. This greatly increased the cost of operation. It is expected that with one-man cars in use on all lines, the operating cost can be materially reduced. Six new Birney safety cars were put in operation on April 15, 1920, and eight more have been ordered.

The railway has two suburban lines, 6 and 7 miles long, respectively. The cash fare on these lines is 10 cents with coupon books making the ticket fare 7½ cents.

Deficit for Vienna Municipal Railways

Aftermath of the War Proves Too Much for Municipal Tramways Despite Heavy Traffic—Road Overstaffed

The tale of a brave fight against overwhelming odds is revealed in the annual report of the Vienna (Austria) Municipal Tramways for the year ended June 30, 1919. It is a story similar, perhaps, to others elsewhere, but it is accentuated by the horrifying increases in the cost of material and labor, by the need for giving work to men who were in war service but who really are not required, and, above all, by the discouragement that comes from underfeeding and the slight hope for an early betterment of economic conditions.

HEAVY TRAFFIC STAVED OFF DISASTER

One gage to the low estate of the Austrian Republic is the fact that the international exchange value of the kroner has fallen from 20.3 cents to 0.45 cent. While the kroner's loss of purchasing power is not so great as this in Austria itself, the fact that the most popular ride (two sections) cost five times as much in June, 1919, as in May, 1916, is significant enough.

During the feverish war years there was a heavy increase in traffic. Part of this, however, came about through the cessation of taxicabs and private vehicles and through the reduction of service and eventual closing down (December, 1918) of the steam Stadtbahn. This increased traffic had to be handled in the face of severe fuel scarcity, shortage of workable rolling stock and lack of experienced personnel. The various fare increases caused only temporary recessions in traffic. The results are all the more remarkable in that traffic kept up after the armistice, although the population of Vienna as of Jan. 31, 1920, has just been announced as 1,842,005 compared with 2,031,496 in 1910, a drop of 9.3 per cent.

The Vienna system has a combination of zone fares, free transfers, unit fares for workmen, special low rates for children, special high rates for racetrack traffic, monthly and semi-annual season tickets, etc. It would take up too much space to note the increases in these various classes of fares, but the changes in the fare paid for the most common length of ride will give a picture of the whole. On June 7, 1916, the first increase raising the popular 12 heller (2.4 cents) fare to 16 heller (3.2 cents) went into effect; the second increase, Aug. 1, raised the fare from 16 heller to 22 heller (4.4 cents); the third increase, Aug. 28, 1918, raised the 22-heller fare to 30 heller (6 cents) and the fourth increase, June 11, 1919, raised the 30-heller fare to 60 heller (12 cents). Since the last report was issued a further increase is reported as of July 8, 1920.

During the period covered by the four fare increases, passenger traffic, density of traffic and revenue per passenger changed as indicated in the accompanying table.

Year	Passengers Carried	Passengers per Car-Mile	Average Revenue per Passenger in Heller (1/5 Cent) and Cents
1916	401,296,245	5.4	16.6 heller 3.3 cents
1917	458,587,787	6.7	18.2 heller 3.6 cents
1918	557,042,590	8.5	21.1 heller 4.3 cents
1919	560,712,667	10.2	28.9 heller 5.8 cents

*The heller is given here at its pre-war exchange value.

Thus, while traffic increased nearly 40 per cent, traffic density increased 88 per cent and revenue per passenger 77 per cent. During the fiscal year ended June 30, 1919, the railway revenue was 160,839,982 kroner. This included 116,862 kroner from freight and express—a service of considerable importance during the shortage of automotive vehicles and draft animals during the war. Operating expenses and other charges exceeded this by 16,202,295 crowns, the first deficit incurred since the municipality acquired the Vienna tramway systems in 1903. In the year 1918, the tramways turned over 8,500,000 kroner profit and in 1917, 7,000,000 kroner. Operating expenses and fixed charges per car-mile in 1919 were actually 100 per cent greater than in 1918, aside from earlier increases.

The chief item of increased expense was in higher wages and the care of employees discharged from the army at the end of the war, both in furnishing them jobs and relieving their immediate needs. Special payments were also made to the displaced female employees. An idea of the desperate state of affairs may be gleaned from the fact that because of fuel uncertainties many labor hours had to be wasted although paid for. The introduction of the eight-hour day January, 1919, (forty-eight-hour-week compared with fifty-one-hour week) and the inability of sadly-underfed men to work with their old-time efficiency also counted heavily. There were 18,364 employees in 1919 compared with 11,963 in 1916. Through the joint efforts of Ludwig Spängler, managing director, and committees of employees, more than twoscore co-operative food distribution shops and restaurants were placed in service.

IRON TROLLEY WIRE AND WOODEN TIRES

The total trackage of the system comprised 585 km. (363 miles) measured as single-track, only a mile or two having been added during the war to permit certain freight and post-office connections. As is well known, copper trolley wire in the former Central Empires was appropriated to quite an extent for military purposes. In Vienna, iron wire had been installed on 137 km. (85 miles) of track. Aside from the losses due to lower conductivity, the rough and easily pitted surface of rolled iron wire in particular has been found to reduce greatly the life of the aluminum sliding bow current collectors as compared with copper wire.

Although provided with 3,072 cars (1,494 motor cars and 1,578 trailers), shortage of labor and supplies was so acute that at one time there were but 759 single car or train units in operation compared with from 900 to 1,000 in pre-war times. On the average, the number supplied, as in July 1918, was only 800. This caused a drop from 173,600 car-miles to 161,200 car-miles a day and the absolute stoppage of nine routes and the partial suspension of service on others. With the arrival of a coal famine lasting from December, 1918, to April, 1919, service was cut off after 8 p.m. and 100 usual stops omitted. Sunday traffic was cut from the regular 736 to 357 operating units. By June 1, 1919, conditions had improved enough to permit service up to 10:30 p.m. in a city of 1,800,000 people. In spite of these amazing handicaps, the traffic actually was 0.7 per cent higher than the year preceding.

One curious item in war expedients relates to the tramways trackless trolley route. It appears that the substitution of wood for rubber as tires overloaded the motors because of the resulting increase in the size of the wheels. This difficulty was overcome by rebuilding the motors for self-ventilation. Gasoline motor-bus operation had to be suspended completely.

Would Issue Equipment Notes

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has applied to the Wisconsin Railroad Commission for permission to issue short-term trust notes to finance the purchase of new cars and other equipment. The application was heard before the commission at Madison on Oct. 9, and at the close of the hearing was taken under advisement.

In its order of Oct. 30, 1919, granting the company an increase in its rates of fare, the commission included a provision requiring the company to obtain not less than 100 cars with a total seating capacity of 5,000 persons. The cars were to be available for service by Nov. 1, 1920. The order was later modified to provide that at least fifty of the cars were to be in use on or before Sept. 1, 1920.

Owing to transportation and other difficulties, the St. Louis Car Company, to which the contract for the cars was awarded, was unable to supply them in time to permit compliance with the commission's order. At the hearing on Oct. 9, John I. Beggs, president of the Milwaukee Electric Railway & Light Company and also of the St. Louis Car Company, testified that deliveries on the new cars would begin on Nov. 1, 1920, and would continue until the 100 new cars are in operation.

P. R. T. Deficit Decreasing

Summary Presented of Earnings for September and for the Nine Months Ended Sept. 30

After deducting fixed charges, which amounted to $820,873, the Philadelphia Rapid Transit Company shows a deficit for the month of September of $50,860, as against a net income of $205,359 for the same month of 1919. This deficit for September contrasted with the showing for the month of August indicates an improvement. The company in its report makes mention of a deferred wage adjustment amounting to $187,500 and a 5 per cent return on stock amounting to $125,000. With these two items considered the company shows a deficit of $363,360.

For the nine months ended Sept. 30 the company shows a net income of $360,012, which is a decrease of 70.2 per cent over the net income for the corresponding period of 1919. The company shows a deferred wage adjustment for a four months' period amounting to $750,000 and with a 5 per cent return paid on stock amounting to $1,125,000 the company shows "an amount by which gross revenues are insufficient" of $1,514,989.

SUMMARY OF EARNINGS OF PHILADELPHIA RAPID TRANSIT COMPANY

Month ended Sept. 30, 1920		1920	1919	Percentage Change Over 1919
Operating revenue		$3,093,995	$3,030,931	2.1
Operation and taxes		2,384,731	2,055,299	16.0
Operating income		$709,264	$975,632	-27.3
Non-operating income		60,749	42,006	43.7
Gross income		$770,013	$1,017,638	-24.4
Fixed charges		820,873	812,279	1.1
Deficit, 1920 — Net Income, 1919		* $50,860	$205,359	-125.0
Deferred wage adjustment— One month	$187,500			
5 per cent return on P. R. T. paid in capital—one month	125,000	$312,500		
Amount by which gross revenues are insufficient to provide for operating expenses, taxes, fixed charges and the 5 per cent return upon P. R. T. stock		$363,360		

Nine Months Ended Sept. 30, 1920	1920	1919	Percentage Change Over 1919
Operating revenue	$27,854,734	$25,995,431	7.2
Operation and taxes	20,560,230	17,888,629	15.0
Operating income	$7,294,504	$8,106,802	-10.0
Non-operating income	422,351	396,095	6.6
Gross income	$7,716,855	$8,502,897	-9.3
Fixed charges	7,356,843	7,295,944	0.8
Net income	$360,012	$1,206,953	-70.2
Deferred wage adjustment — four months	$750,000		
5 per cent return on P. R. T. paid in capital, nine months	1,125,000	1,875,000	
Amount by which gross revenues are insufficient to provide for operating expenses, taxes, fixed charges, and the 5 per cent return upon P. R. T. stock		$1,514,989	

*Deficit.

Committee Appointed to Inquire Into Denver Finances

Members of the board of directors of the Denver (Col.) Tramway have appointed a committee to investigate the financial condition of the company and formulate, if possible, a method of preventing the company from being thrown into the hands of a receiver.

The payment on bonded indebtedness due on Oct. 1 was not met, but it is anticipated that within the six months intervening before another payment becomes due the money may be forthcoming. The total sum due on Oct. 1 was $87,000. It is the interest accumulated on outstanding bonded indebtedness totaling $2,500,000, issued for three years at 7 per cent.

An interest payment due on Nov. 1 totals $278,930. An additional sum will be necessary to retire 1 per cent of the bonds for the sinking fund, which is provided for annually. Mr. Boettcher, chairman, said:

> The company cannot pay the money at this time. That does not mean, however, that we will not be able to pay it in the near future. Of course, we have been at a big expense lately, and then our revenue was cut down for a time when there were no cars running. Before the second payment on the indebtedness comes due I think it highly probable that we will be able to meet the obligation. I do not think there is any possibility of a receiver being appointed. In the meeting of the directors we selected a committee to take up the matter and see what can be done.

Receivership Hearing

Court at Kansas City Sets Oct. 26 for Naming Permanent Receiver—Dramatic Appeal by Employees

Judge Stone in the Federal Court at Kansas City, Mo., on Oct. 21 set Oct. 26 for the appointment of a permanent receiver or receivers for the Kansas City Railways. Many other matters involved will also be heard then, including the suggestions of supply creditors and requests for immediate determination of the status of contractors.

The interests represented at the hearing before the court on Oct. 21 in connection with matters affecting the receivership expressly disclaimed any purpose to secure the appointment of a receiver who would conserve any special interest. The representative of the committee which is acting for the bondholders, however, suggested the appointment of James D. Mortimer as receiver. Kansas City, Kan., interests nominated L. H. Chapman, now Water and Light Commissioner, who has built up the light plant on the Kansas side.

Three intervening petitions were filed. The first was by the Continental & Commercial Trust & Savings Bank, Chicago, and E. F. Swinney, Kansas City, trustees under the first mortgage. The second was by the American Car Company in the interest of noteholders. The third was by the city of Kansas City, Mo., and the A. S. Heckert Construction Company, which is proceeding with work on the Twenty-third Street viaduct. Representatives of Wyandotte County announced that the county might intervene because of an obligation of $800,000 concerning the use of a bridge and viaduct.

Frank Hagerman announced that he was in court to represent J. O. Armour and nobody else, Mr. Armour having advanced $1,000,000 for interest, $500,000 for equipment and other sums for other purposes. Mr. Hagerman receded from any implied recommendations of men for appointment as receiver.

Henry Russell Platt spoke for the protective committee representing the bondholders.

Colonel Harbor, City Counselor of Kansas City, Mo., declared that it was possible for a receiver of the right kind to operate the property in the public interest without any further increase in fares. He also declared that it was impossible for the company ever to pay the bonds in full and that the facts would be shown to the court.

PRESIDENT KEALY SURPRISED

A dramatic feature of the proceedings was the presentation to the court of petitions and statements from employees of the Kansas City Railways urging that there be no disturbance of present pleasant relations between the employees and the company, and that Col. P. J. Kealy, now president of the company, be made one of the receivers or retained as operating head of the company. The document was signed, it was said, by 3,300 employees.

John B. Pew, attorney presenting the petition by the employees to the court, recited the steps of the past two years which have built up the present harmonious organization. The most impressive paragraph of the document was the promise by these signatories that they would co-operate heartily with the receivers and the court, and that they would resist any interruption of service.

Colonel Kealy, to the court, disclaimed any prior knowledge of the action of the employees. He expressed appreciation of the compliment, but asked definitely that the request of the men be disregarded.

Mr. Pew, further presenting the interest of the employees, requested definite assurance that they would be heard by the court and receivers, although he said that the men had no purpose to intervene in the proceedings.

There was no intimation as to whether a single receiver or several receivers would be appointed.

Receivers Would Sell Road

Application has been made to the Superior Court at New London, Conn., by Robert W. Perkins, receiver of the Shore Line Electric Railway, to sell the Norwich & Westerly Railway. Petitions have been signed for authority to discontinue the operation of the road on Nov. 15 if it should be deemed advisable by the receiver so to do. The application names $191,047 as the price at which the road could be sold, but Mr. Perkins states that this did not mean that he has a customer who would take the road at that price. Rather it is an "upset price" on which the court is to be asked to give him authority to sell in case he can find a customer at that figure or better. In regard to the application to discontinue the line Mr. Perkins said it did not necessarily imply that the road was to be discontinued on that date.

Financial News Notes

Jitneys Force Suspension.—Electric railway service between Danbury and Bethel, Conn., was suspended on Oct. 18 by the Danbury & Bethel Street Railway on account of the controversy over jitney regulation referred to in the department of Traffic and Transportation elsewhere in this issue.

Interest Payment Ordered. — The United States District Court has ordered Joseph K. Choate, receiver, to pay the coupons on the Aurora, Elgin & Chicago Railroad first mortgage 5 per cent bonds, which was due on April 15. The necessary funds have been deposited with the trustees.

Milwaukee Company Sells Bonds.—The Milwaukee Electric Railway & Light Company, Milwaukee, Wis., has completed the sale of $5,000,000 of 7½ per cent first mortgage bonds. The proceeds of the sale will be used to finance the company's new power plant now under construction. The bonds were purchased by a marketing syndicate. They will be retired by means of a 3 per cent sinking fund each year, so that during the twenty-five years the issue runs, 75 per cent will be paid off at the maturity date.

City Asks Receiver for Railway.—The suit which the city of Davenport has been threatening to file against the Tri-City Railway, in which it asks that the company be placed in the hands of the receiver, has been brought in the Scott County District Court by City Attorney U. A. Screechfield. The filing of the suit is in accordance with a resolution passed by the City Council several weeks ago. The petition charges that the company violated the terms of its franchise by failing to keep its property in repair and by charging excess fares, that the cars are unsanitary and cites other reasons why the company should go into receivership.

Interurban Results Improving. — Harrison B. Freeman, receiver of the Hartford & Springfield Street Railway, Warehouse Point, Conn., told the Superior Court an Oct. 16 that his lines had been operating at a profit the last three months. He obtained an order from the court to continue business for four more months. Operation of the company is under the scrutiny of a committee which represents the holders of the bonds of the company. Profits during the summer were reduced by the company's inability to get coal at any price, but on the whole the results were fairly satisfactory. The balance over operating expenses in June was $191.98; in July, $5,155, and in August, $2,195.

Service May Be Suspended in Concord.—At a recent public meeting held in the Town Hall of Concord the present status of the Concord, Maynard & Hudson Street Railway, Maynard, Mass., was discussed. D. P. Abercrombie, Jr., vice-president and general manager of the road, explained that unless financial assistance was rendered by the residents of the towns between Concord Centre and Concord Junction electric railway service in Concord and to Maynard would be suspended. The company has for some time been operating in this section at a loss. The townspeople have already voted against extending financial aid to the railway.

Master Appointed to Conduct Sale.—Announcement was made on Oct. 13 by United States District Judge Julius M. Mayer of the appointment of Francis M. Scott, former justice of the Appellate Division of the Supreme Court, as master in the sale at auction of properties owned by the New York Railways. The sale is the result of a suit instituted by the bondholders' committee. Joseph P. Day will auction the real estate holdings of the company on Nov. 9. Included in the offering is the carhouse property bounded by Fourth and Lexington Avenues and Thirty-second and Thirty-third Streets; the carhouse at Madison Avenue, Eighty-fifth to Eighty-sixth Streets; a large parcel of property on Front Street, and several on East Tenth and Eleventh Streets, near Avenue C, including a large warehouse.

City to Use Depreciation Fund.—The depreciation fund of the Municipal Railway of San Francisco is to be drawn upon to the extent of $250,000 so that the work on the city's Hetch Hetchy water-supply project can go on, according to reports of a meeting of the Board of Supervisors of that city held on Oct. 4. This action by the Supervisors was made possible through a resolution providing for the sale of $250,000 worth of Hetch Hetchy water bonds maturing from 1930 to 1932 and carrying 4½ per cent interest. These bonds are to be placed to the credit of the Municipal Railroad depreciation fund as a financial investment for the street railway, while the $250,000 cash will be applied to the credit of the Hetch Hetchy project. Acting Mayor Ralph McLeran made the statement that the depreciation fund now totals about $600,000. He considered the transaction a good investment for the railroad and at the same time a great benefit to the water project as, in the absence of immediate cash to finance the bills, all operations would have to be abandoned pending the outcome of the taxpayers' suit against the cost-plus fee contract with the Construction Company of North America which is still under advisement in the court.

I. T. S. Subsidiary Financing.—Emery, Peck & Rockwood, Chicago, Ill., recently offered $650,000 of five-year 8 per cent bond-secured convertible gold notes of the Danville, Champaign & Decatur Railway & Light Company at 100 and interest. The proceeds of the issue are to be used to reimburse the company for extensions and additions and for the retirement of underlying bonds. The notes are guaranteed unconditionally, principal and interest, by the Illinois Traction Company. The Danville, Champaign & Decatur Railway & Light Company controls through stock ownership the properties operating substantially all the electric light and power, gas, steam heating and electric railway systems in the Illinois cities of Danville, Champaign, Urbana and Decatur. The company has outstanding $730,000 of 6 per cent cumulative preferred stock, $3,688,000 of common stock, $3,318,000 of collateral trust 5's, $650,000 of five-year 8 per cent secured notes (this issue). In addition there are outstanding $1,980,000 of underlying bonds on mortgages which are now closed.

Intercorporate Claims Adjusted.—A decree has been entered by Presiding Justice Tanner in the Superior Court, whereby the Providence & Danielson Railroad, Providence, R. I., is to pay Receiver Cornelius S. Sweetland of the United Traction & Electric Company $60,000 in settlement of claims. The payment of $60,000 is to be made from the $200,000 damages which the city has agreed to pay the Danielson line in connection with the condemnation proceedings for the construction of the city reservoir. Decrees were entered for the purpose of obtaining releases from receivers of various transportation roads interested, so that future suits could be avoided. Receiver Sweetland will hold the $60,000 in trust for the Union Railroad, Pawtucket Street Railway and the Rhode Island Suburban Railway, all included in the system of the United Traction & Electric Company. The remainder of the $200,000 city payment is to be split, $100,000 to the Federal trustees and $40,000 for the Providence & Danielson Railroad. The $60,000 payment is to be in lieu of all claims against the Danielson line by all the companies involved for losses and deficits incurred by operation of the Danielson road by the Rhode Island Company receivers from the beginning of the receivership to and including Sept. 6, 1920.

Traffic and Transportation

Cleveland Increase Soon

City Council Authorizes Two-Cent Advance in Company's Operating and Maintenance Allowances

The City Council of Cleveland, Ohio, has granted the Cleveland Railway a total increase of 2 cents a car-mile in its operating and maintenance allowances. The Council took action at the urgent request of John J. Stanley, president of the company, who late in August notified the city authorities that the interest fund would fall below the minimum of $300,000 on Aug. 30. The increase in allowances for operation and maintenance presupposes an automatic advance in fare to a 6-cent cash basis, with nine tickets for 50 cents and 1 cent for each transfer.

The advance in allowances dates from Oct. 1 and was granted for six months only. The expected higher fare will probably not be for longer than that period, according to Street Railroad Commissioner Fielder Sanders. The fare rise may not come before the middle of November, or it may come during the present month when the September interest figures are established.

REFUSES 4.5-CENT ADVANCE

The increased allowances were made necessary by expenditures of over 4½ cents a car-mile more than the allowances in the last three months, the commissioner informed the street railway committee of the Council. Commissioner Sanders refused to sanction a 4.5-cent increase. The six months' limit was fixed, the commissioner explained, because he anticipates a drop in prices which would reduce expenses, make a high allowance unnecessary and probably bring back the present fare.

Commissioner Sanders, commenting on the Council's action, said:

> This means the interest fund will go down and the fare will inevitably go up.
>
> I say to you, frankly, I don't believe this railroad can be operated much longer on a 5-cent fare. Whether the break will come in two weeks or six, I do not know, but revenues the last two or three weeks have not been holding up and the maximum fare may come sooner than was expected. We are only doing the just thing in raising the allowances.

The Council also granted the company authority to reimburse itself for the deficiency incurred up to Oct. 1, at the rate of not less than $25,000 a month, the exact sum to be left to the discretion of the commissioner. The deficit from the first of the year to Sept. 1 was $332,534. It resulted from costs being higher than the allowances, which were 28 cents a car-mile for operation and 10 cents a car-mile for maintenance. The new allowances will be 29 cents for operation and 11 cents for maintenance. The interest fund, which is the fare gage, is figured on allowances and not actual expenditures. When the fund drops below $300,000 the fare goes up automatically. It was $316,000 Aug. 1. If the drop for September maintains the average of the previous six months the interest fund is below the turning point. The city will seek to enjoin the company from collecting the maximum fare unless the fund is more than $71,813 below $300,000. This $71,813 is the sum the company paid its stockholders during the controversy over an increase in the rate of dividend from 6 to 7 per cent, later defeated at the polls. The city is trying to get it back.

Seattle $500,000 Behind

In the second public speech within a week on the question of the municipal railway, Mayor Hugh M. Caldwell of Seattle, Wash., suggested as a possible alternative to a further advance in fare an increase in the city's general fund tax levy to provide additional money for the operation of the railway. He said that the road has been operating at a loss. The Mayor read a list of ten cities with fares ranging up to 8 cents, as compared with 6½ cents charged in Seattle. He submitted figures which indicated that only during one month of the past year have the receipts of the road exceeded the expenditures. On Sept. 30, the railway was more than $500,000 "in the red."

From the Seattle Daily Times

"THE HOLE IN THE TOKEN"

During August of this year, a total of 9,964,000 people rode on the cars, as compared with 11,942,000 during August of last year. Mayor Caldwell asserted that he had not formed a definite opinion as to what was the best thing for the City Council to do in regard to the railway problem, but that he was anxious to have it discussed and considered by the people of the city, so that their wishes in the matter might be crystallized.

Eight Cents Asked in Lincoln

The Lincoln (Neb.) Traction Company has applied to the State Railway Commission for authority to raise its cash fare to a basis of at least 8 cents as an emergency measure. The company asks permission to sell four tokens for 30 cents. It now charges a 7-cent cash fare with three tokens for 20 cents. The higher fares are requested pending the fixing of permanent rates by the commission.

The company also asks for an increase in its allowance for maintenance and depreciation. This latter charge as fixed by the commission is 7.2 per cent. It asks that this be increased to 9 per cent of the valuation of depreciable property as heretofore fixed by the commission. This will add $40,000 a year to the operating expenses of the company.

The company represents in its application that on a 7.2 per cent basis for maintenance and depreciation the deficit at the end of the year will be $21,292. With the $40,000 added this will make a total deficit of $61,000 for the year. The report of passengers carried from 1915 to Sept. 1, 1920, shows a falling off of approximately 6 per cent for 1920 as compared with the year 1919. It alleges this is entirely due to the increased use of the automobile. The report shows the main decrease is on lines where automobiles are largely used. Another reason for asking for an increase in the present emergency rate is the increase of $1.80 a ton in the cost of coal for fuel since Jan. 1, 1920, and an increase in freight rates on all material since Sept. 1.

Recount Asked on Duluth Vote

The Duluth (Minn.) Street Railway on Oct. 15 filed with the Federal District Court at Duluth a petition for a recount of the votes cast in the special referendum election on Oct. 4 in which the company was refused an increase in fare from 5 cents to 6 cents. The company charged irregularities and errors in the counting of the ballots. The official count showed that the proposition to allow the company to raise its fare had been rejected by 635 votes.

Following the announcement by Herbert Warren, general manager of the company, that the service would be materially cut to allow a 10 per cent increase in wages to the employees, City Attorney John E. Samuelson has given an opinion that the City Council has the right to order changes in the schedules as it sees fit and proper. On Oct. 11 the company laid off several of its crews and discontinued all owl cars, contending that it had no funds with which to meet the demands of the men for higher wages and that it would be necessary to cut the service. No complaint has yet been made to the City Council of the cut in service and to date no action has been taken to force the railway to put on more cars.

Seven Cents in Philadelphia

Temporary Rate Fixed by Commission Pending Determination of Valuation—Tickets at Six and a Quarter Cents

The Philadelphia Rapid Transit Company was directed on Oct. 18 by the Public Service Commission of Pennsylvania to file with that body not later than Oct. 29 a tariff to become effective on Nov. 1, providing for a 7-cent cash fare and a 6¼-cent rate of fare where coupon tickets in blocks of four are purchased, with the present transfer and exchange ticket privileges remaining in force. The new rates are to continue for a period of six months unless the commission directs a different rate of fare prior to that time. Tickets are to be put on sale by the railway at its offices and are to be sold by conductors. The company is to file with the commission monthly reports of its receipts and expenditures. The company has agreed to accept the order.

THE order of the commission is simply a temporary finding. That body will not undertake to fix any permanent rate of fare until the valuation of the railway has been completed. This work will take several months and the testimony presented at the hearings showed that unless the railway received immediate relief by having provision made for more revenue it could not continue to operate and would suffer such financial embarrassment as would prevent its giving proper service. In the opinion of the commission this would be a catastrophe to the community at large. In consequence the commission announced that it was prepared to permit the company to file a new schedule which would provide more revenue.

On June 1, the company filed a tariff providing for the elimination of free transfers and the extending of the 3-cent exchange charge to all points in the city at which free transfers had theretofore been honored. At the public hearing in Philadelphia before the commission the city of Philadelphia presented objections to this new schedule.

ASKED CHARGE FOR TRANSFERS

At the suggestion of the commission, this tariff was voluntarily suspended and later, by order of the commission, dated July 26, 1920, the company was directed to make no change in its tariff, effective prior to July 1, 1920, until the commission should take final action. The company later withdrew the tariff and the commission revoked its order of July 26, in so far as it related to the rates.

The company then sought the consent of City Councils of Philadelphia to a change in the rate of fare under the 1907 contract. This consent the City Council did not give, and on Oct. 4 the company asked to be permitted to file a new schedule to become effective upon one day's notice, which schedule provided for the elimination of all exchange tickets and all free transfers and for a 5-cent straight fare.

Considerable testimony was taken in connection with this petition and a very careful investigation of the matter was made by the Bureau of Engineering of the Public Service Commission. As a result of its study of the matter the commission is convinced that to eliminate all exchange tickets and free transfers would result in a discrimination against certain sections of the city and would impose upon a large number of the car riders a burden which would not be fair and equitable.

WAGE INCREASE DEFERRED

At the hearings T. E. Mitten, president of the Philadelphia Rapid Transit Company, testified that the company had been unable to pay its employees the rate of wage agreed upon between the company and the men and that they voluntarily waived payment of the increased wages until such time as the revenues of the company could be increased to an extent that would warrant the payment of the increased wages. On this point the commission said:

> That the wages should be paid and that better service should be given by the Philadelphia Rapid Transit Company to the citizens of Philadelphia is beyond question. The Philadelphia Rapid Transit Company has been directed to file with the commission an inventory of its property, in order that the commission may determine the fair value of its used and useful property as a basis for the proper, permanent rate base.

The Bureau of Engineering of the Public Service Commission, by direction of its chief engineer, will, in association with the engineers of the Philadelphia Rapid Transit Company and the engineers of the city of Philadelphia, make a thorough investigation looking to the improvement of the service rendered by the company, necessary extensions to the system and needed additional equipment to enable the company to give better service to the car-riding public. It will promptly submit to the commission recommendations for the elimination of skip-stops that are unduly burdensome and dangerous to the public.

Asks Seven-Cent Fare

The International Railway, Buffalo, N. Y., has asked the City Council of Niagara Falls to approve a 7-cent fare for the company's lines in that city. A 5-cent fare is now being charged. In a letter to the municipal authorities, H. G. Tulley, president of the International, says that if the company is expected to make large capital expenditures for paving and track improvements in Niagara Falls some relief must be obtained from the conditions which now exist. It is suggested that action be taken by the city looking to the submission to the Public Service Commission the question of whether the company is entitled to more revenue to meet this and other necessary expenditures in its public service. The municipal authorities have asked the company to spend approximately $50,000 for track improvements and paving between its rails in certain Niagara Falls streets.

Ten Cents in Connecticut

The Connecticut Public Utilities Commission on Oct. 22 authorized the Connecticut Company, New Haven, to charge a 10-cent fare. The new rate is to apply throughout the company's system. The company has been operating at a 7-cent fare since early in August. The members of the commission approved the increase by a vote of two to one.

At a hearing before the commission on Oct. 1 Lucius S. Storrs, president of the railway, and other company officials testified that the 7-cent fare had proved entirely inadequate and that a fare of 10 cents was needed if the system was to remain intact. Evidence was introduced at the hearing to show that total receipts for the first eight months of 1920 amounted to $12,715,017. The estimated expenses of the company to Dec. 31, 1920, were placed at $15,657,222.

Transportation News Notes

Seven Cents in Hot Springs.—A 7-cent cash fare went into effect on the lines of the Hot Springs (Ark.) Street Railway on Sept. 25. The company has been charging a 6-cent fare since September, 1919. Prior to that time the fare was 5 cents.

Seven Cents in Selma.—The Selma (Ala.) Electric Railway on Oct. 1 raised its fare from 6 cents to 7 cents. At the same time rates for "owl" service were raised to 10 cents. The company recently increased the wages of its motormen and conductors.

One-cent Rise on Interurban. — The Hagerstown & Frederick Railway, Hagerstown, Md., will raise its interurban rates from 7 cents to 8 cents in each zone, beginning Oct. 1. Tickets will be sold at the rate of thirteen for $1. City fares in Hagerstown and Frederick will remain at 7 cents cash, with five tickets for 30 cents.

Seven Cents on Houghton Lines.—Fares on the lines of the Houghton County Traction Company, Houghton, Mich., have been raised from 6 cents to 7 cents in each zone. Four tickets are sold for 25 cents. The new rates were authorized by the Michigan Public Utilities Commission, and were put into effect on Aug. 16.

No Advance in Scranton.—The Pennsylvania Public Service Commission has denied the petition of the Scranton Railway for an increase in fare to 10 cents on its Scranton city lines. The commission declined to permit an advance in fare at this time owing to the fact that the valuation of the company's property had not been completed.

Wants More in Kingston. — The Kingston (N. Y.) Consolidated Railroad has petitioned the State Public Service Commission, Second District, for an increase in fare. The company asks the commission to fix such a rate which, after investigation, it shall find just and reasonable. The present fare is 6 cents.

Eight Cents in Ashtabula.—An 8-cent cash fare took effect in Ashtabula, Ohio, on Sept. 10. The City Council had previously approved a recommendation of Federal Judge D. C. Westenhaver that the Ashtabula Rapid Transit Company be permitted to raise its rates. Four tickets are sold for 30 cents. The fare was formerly 5 cents.

Fares up on Interurban.—Fares on the interurban lines of the Peninsular Railway, San José, Cal., have increased 20 per cent by authority of the State Railroad Commission. The new rates took effect on Oct. 16. The round trip rate, including war tax, between San José and Palo Alto is now 78 cents, Los Gatos 52 cents, Campbell 30 cents. The company has never paid a dividend.

Will Vote Again on Denver Fare.—Citizens of Denver, Col., will again be called upon at a special election in the spring of 1921 to decide the question of the fare to be charged by the Denver Tramway. An initiated bill providing that the fare be reduced from 6 cents to 5 cents was recently presented to the City Council. The Council, after consideration of the proposal, decided to submit the matter to a popular vote.

Cities Fight Fare Advance.—Steps have been taken by the city authorities of Louisville, Ky., and New Albany and Jeffersonville, Ind., to oppose an increase in fares by the Louisville & Northern Railway & Lighting Company, New Albany. The company proposed to raise its fares between Louisville and the cities of Indiana from 7 cents to 10 cents on Oct. 31. The sale of commutation tickets is to be discontinued.

Asks Rise on Kansas Line.—Application has been made to the Kansas Court of Industrial Relations by the Manhattan City & Interurban Railway, Manhattan, for permission to raise its fare on its lines in Manhattan from 5 cents to 10 cents. The company proposes to sell four tickets for 30 cents. It is also proposed to raise the fare on the interurban lines from a basis of 2.4 cents a mile to one of 3 cents a mile.

Will Argue Jitneys' Rights.—Final arguments on the petition of the Public Service Railway, Newark, N. J., to have thirty-one operators of motor buses competing with its lines ruled off the streets will be heard in the Court of Chancery in Jersey City on Dec. 13. The busmen recently filed their answers to the railway's complaint. They contended that the interest of the public demanded the continuance of the bus service.

Ten Cents on Suburban Line.—The Connecticut Public Utilities Commission has authorized the Waterbury & Milldale Tramway, Waterbury, to raise its fare to 10 cents. At hearings before the commission the company showed that in 1918 it operated at a net loss of $12,597. Its operating deficit for 1919 amounted to $25,505. The commission denied a petition filed by patrons of the road asking that the fare increase be refused.

Seven Cents in Plattsburgh.—The Public Service Commission, Second District, has authorized the Plattsburgh (N. Y.) Traction Company to increase its maximum fare between any two points on its line within Plattsburgh from 5 cents to 7 cents. The city authorities recently waived a franchise restriction limiting the fare to 5 cents, provided the commission found that the increase was justified. There was no opposition to the company's application at a hearing before Commissioner J. A. Kellogg.

Suspends Everett Increase. — The Washington Public Service Commission has suspended for a period of ninety days a proposed increase in rates by the Puget Sound International Power Company, Everett, operating the electric railway system in the city of Everett. This action was taken when a complaint was received by the commission from the city attorney of Everett, against the rates, which were to have gone into effect on Oct. 1. The company proposed to replace the present 5-cent fare with one of 10 cents.

More Buses for Wilmington.—The Wilmington & Suburban Transportation Company has been incorporated under the laws of the State of Delaware to operate a line of motor buses in Wilmington. The company is capitalized at $50,000. It proposes to begin operation before the end of October. Each bus will seat twenty-eight persons and will be fitted with cross seats and a vestibule. Officers of the new company are: President, Leslie R. Casperson; treasurer, Harry Butler; secretary, George McGee.

City Lines on Mileage Basis.—A petition asking an increase in fares has been presented to the Indiana Public Service Commission by the Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis. The petition asks a passenger fare of 3 cents a mile in Indianapolis with a minimum charge of 10 cents. The present fare is 5 cents. The company also asks the commission to grant an increase in express and freight rates. The company operates more than fifteen miles of line within the city on various divisions.

Wants More on Interstate Line.—The Steubenville, East Liverpool & Beaver Falls Traction Company, East Liverpool, Ohio, has filed a new tariff with the Interstate Commerce Commission, the Ohio Public Utilities Commission and the Pennsylvania Public Service Commission under which a zone system is to be installed. The increase sought will be about 33⅓ per cent. The company operates a line between Vanport, Pa., and Steubenville, Ohio. It also asks for an increase from 5 cents to 8 cents on the city line in East Liverpool.

Asks Higher Commutation Rates.—The Schenectady (N. Y.) Railway has made application to the Public Service Commission for the Second District, for a modification of orders of the commission to permit it to abolish certain reduced fare rates and to increase its fifty-four-trip commutation ticket book rates. The company alleges that notwithstanding the increased fares allowed in July the revenue of the company is insufficient to meet increased wages and other increased costs. The reduced fare rates are on all divisions.

New Railway Guide.—A new pamphlet has been issued by the publicity department of the San Diego (Cal.) Electric Railway for free distribution to the public. It contains general information about the city, beach and suburban railway lines of San Diego. It tells an interesting story to residents of the city and is a valuable guide for strangers. A map is enclosed in the folder showing the exact location and extension of the railway lines. Copies of this "where-to-go" folder can be obtained at any information bureau.

Compromise on Higher Fare.—Announcement that the Youngstown & Suburban Railway, Youngstown, Ohio, would give up the franchise under which it was granted an increase in fare from 5 to 7 cents was made on Oct. 8 after a conference between officials of the company and Mayor Fred J. Warnock. The action will permit repeal of the ordinance at the next session, of Council, which, in turn, would call off the referendum on the ordinance set for Nov. 2. In recent negotiations with patrons of its lines the company offered to incorporate in a new ordinance a provision for the sale of 100 tickets for $5.50.

Would End Commutation Tickets.—The Pacific Electric Railway, Los Angeles, Cal., has applied to the State Railroad Commission for permission to discontinue the sale of commutation tickets between Pasadena and Alhambra and Los Angeles. The company also asks authority to abrogate the transfer privilege between its interurban lines and its local line in the two former cities. The prospect of motor-bus competition is given by the railway as the reason for its petition. Two petitions are now pending before the commission for authority to operate bus lines in competition with those of the railway in Alhambra.

Suburban Line Needs More.—Application has been made to the Public Service Commission for the Second District by the Hudson Valley Railway, Glens Falls, N. Y., for authority to charge 10-cent fare within each local zone outside Glens Falls and Saratoga

Springs, excepting in the zone within Troy, and that in the latter zone such rate of fare be established as may be just and reasonable. The company alleges that nothwithstanding the fare now in effect the revenue obtained does not yield an adequate return and that it has not received since Nov. 25, 1918, reasonable compensation for the service rendered.

Wants Parlor Cars Revived.—William C. Culkins, Street Railway Director of Cincinnati, Ohio, has suggested the renewal of the use of parlor cars by the Cincinnati Traction Company. He points to the fact that delegates attending conventions in the "Queen City" and who are desirous of seeing the outlying districts could charter parlor cars, which could be given the right of way and go over the various scenic routes in the city. Until recently such cars were frequently used in Cincinnati. The convention and publicity department of the local Chamber of Commerce is advocating their reintroduction.

Six Cents in Aberdeen.—The Gray's Harbor Railway & Light Company, Aberdeen, Wash., has raised its fare from 5 cents to 6 cents within the city limits of Aberdeen, Hoquiam and Cosmopolis, and from 10 cents to 12 cents on its lines between any two of the three towns. The new rates were authorized by the State Public Service Commission. In the petition the company asked for a 7-cent fare. With an allowance of 5 per cent decrease in traffic because of the higher fare, the commission finds that the company should be able to earn 7.4 per cent on its investment if its operating expenses repair the same as in 1919.

Service Withdrawn Because of Jitneys.—Electric railway service between Danbury and Bethel, Conn., was suspended on Oct. 18. Traffic is being handled by the jitneys and steam trains. The discontinuance of electric railway service will continue until the City Council of Bethel passes an ordinance barring the jitneys from the highways where electric railway cars run. The Board of Aldermen of Danbury on the night of Oct. 18 passed an ordinance barring all jitneys from the streets traversed by the cars of the Danbury & Bethel Street Railway. The railway had announced that it would stop all service in Danbury on Nov. 1 unless jitney bus traffic was restricted to the side streets not used by the trolley cars.

Will Hear Rate Appeal.—The Interstate Commerce Commission has ordered a hearing in Salt Lake City, Utah, on Nov. 1 of the appeal taken by a number of railroads from the decision of the Utah Public Utilities Commission with regard to increased freight and passenger rates. The petitioners in the proceeding are the Bamberger Electric Railroad, Salt Lake City, the Deep Creek Railroad, A. R. Baldwin, as receiver of the Denver & Rio Grande Railroad, the Tooele Valley Railway, the Los Angeles & Salt Lake Railroad, Oregon Short Line Railroad, the Salt Lake & Utah Railroad, the Southern Pacific Company, and other steam and electric roads handling intrastate traffic.

Suburban Rates Go Up.—Tariffs have been filed by the Twin City Rapid Transit Company, Minneapolis, Minn., providing for a 20 per cent increase in the fares on the company's lines to Stillwater and Lake Minnetonka. As the rates remain within the limit of 2 cents a mile provided by the Minnesota law, the company is not required to file a petition for the advance with the State Railroad and Warehouse Commission. The new rates became effective within ten days of Oct. 7. The advance amounts to 1 cent for each 5-cent zone. In an effort to improve its service in Minneapolis as a result of the recent granting of a 6-cent fare on the city lines, the company has placed in operation thirty additional cars since Aug. 16.

Wage Rise Brings Fare Plea.—The Cincinnati, Newport & Covington Railway, Covington, Ky., the employees of which were recently granted a 20 per cent increase in pay by a board of arbitration, has started a campaign to have the cities of northern Kentucky allow it to raise the fare from 5 cents to 8 cents. Under the provisions of present franchises granted by four Kentucky towns several years ago the company must transport passengers for 5 cents. The franchises also stipulate that cars shall be operated past a given point at least every fifteen minutes. The company has been supplying a three-minute service and threatens to revert back to the schedule provided in the franchises if an increase in fares is not allowed.

Opposes Service at Cost.—Dr. Henry Jameson, chairman of the board of directors of the Indianapolis (Ind.) Street Railway, declared at a recent hearing before the Indianapolis City Council that he was opposed to the adoption of a service-at-cost plan in Indianapolis. Dr. Jameson several months ago expressed himself as in favor of a flexible rate of fare as affording the best prospects of relieving the company's financial condition. At the hearing before the Council he stated that his change in attitude had resulted from a study of the plan as applied in other cities. Dr. Jameson also expressed opposition to the passage of an ordinance under which it is proposed to reroute the company's lines in the business district of the city.

Repeals Higher Fare Grant.—The City Council of Findlay, Ohio, has repealed an ordinance under the terms of which the Toledo, Bowling Green & Southern Traction Company, Findlay, was given permission to raise its fare from 5 cents to 10 cents on its local lines. The Council took this action after the company had refused to accept the fare ordinance except on conditions which the city would not grant. The Council authorized the company to raise its fare after the latter had made application for permission to abandon service on the ground that operation of the cars did not pay. The Council refused this request, allowing the increased fare as an alternative. The 10-cent rate was never put into effect. The company has since applied to the Ohio Public Utilities Commission for permission to cease operation.

Ten Cents in New London.—A 10-cent fare was placed in effect on Oct. 15 on the New London, Conn., Division of the Connecticut Company. The New London lines, formerly operated by the Shore Line Electric Railway, were returned to the Connecticut Company some time ago under a court order. The Connecticut Public Utilities Commission has received a petition of protest from the citizens of New London against the 10-cent fare. The petition declares that the new rate is unreasonable. The New London Common Council backed up the citizens in their appeal to the State Commission. The petition asks the commission to conduct a hearing on the subject and that the Connecticut Company be directed to show cause for the increase in fares.

Will Raise Northampton Fares.—A new schedule of rates will be placed in effect on the Northampton (Mass.) Street Railway on Nov. 8. On the Easthampton line the unit of fare will be raised from 7 cents to 8 cents, making the fare between Northampton and Easthampton 16 cents. Special tickets, good on all lines other than the Easthampton line, which have been sold at a rate of five for 50 cents, will be sold at a rate of five for 55 cents. The unit of fare on all but the Easthampton line remains at 7 cents. By the use of tickets or combinations of tickets and cash fares the following rates will be in effect: Between Northampton and Williamsburg, 29 cents; between Northampton and Leeds, 18 cents; between Northampton and Haydenville, 22 cents, and between Williamsburg and Haydenville, 11 cents.

New Publications

Proceedings of the National Safety Council for 1919

Paper, 1457 pages. Published by National Safety Council, Chicago, Ill.

This publication contains the detailed history of the eighth annual Safety Congress, held at Cleveland, Ohio, in 1919. There are 41 pages devoted to the Electric Railway Section, covering a discussion of safety devices and methods.

The Engineering Index for 1919

Published by the American Society of Mechanical Engineers, New York City.

The American Society of Mechanical Engineers took over the publication of the "Engineering Index" at the close of 1918 and has since been publishing the index monthly as a part of *Mechanical Engineering*. The present volume is the first to be compiled by the staff of the society and the arrangement of references has been changed to render them more readily accessible. Whereas the items have been previously grouped under divisions of engineering, such as civil, electrical, mining, mechanical, etc., in this volume the alphabetical or dictionary arrangement has been employed. Each item contains the exact title of the article indexed, the author's name, the name of the periodical in which the article appeared, the volume number and date of publication and the page numbers and numbers of figures in the articles. Each item concludes with a brief note summarizing the article indexed.

This index contains more than 12,000 items referring to articles in nearly 700 engineering and allied technical publications. A reference list of the publications, giving exact titles, place of publication and frequency of issue, is included. The thoroughness of the work is indicated by the fact that in preparing the items the engineering staff of the society has reviewed approximately 1,100 periodicals, reports and other publications regularly received by the Engineering Societies Library. These are printed in ten different languages.

Proceedings of the American Electric Railway Engineering Association for 1919

Published by the American Electric Railway Association, 8 West Fortieth Street, New York, N. Y. 400 pages.

The proceedings cover the activities of the association from 1916 to 1919, including a complete report of the seventeenth annual convention, held at Atlantic City in 1919.

Transactions of the Institution of Civil Engineers of Ireland—Vol. 44

Published by the Institution, 35 Dawson Street, Dublin, Ireland.

This volume is of particular interest to electric railway men as it includes a paper on "Modern Tramway Track" by Robert B. Holt. Mr. Holt outlines the European methods of constructing street railway track, practically none of which include the use of the customary American crosstie. In regard to the wear of rails, it is stated that speed is far more destructive to rails than traffic density. Particular emphasis is placed upon the contention that rails should be designed with a convexity of tread of about 12-in. radius, as this is approximately the shape which will ultimately be assumed under wear. It is said that much unnecessary wear is caused by the use of the flat "coned" tread design.

In reference to rail joints, the thermit welded joint is said to be the standard on the majority of English tramways. Some space is devoted to a discussion of rail corrugation, and it is concluded that this evil can be mitigated to a very considerable extent by raising the elastic limit of the steel.

Personal Mention

Mr. Yungbluth Promoted

Former Store-Keeper, Pittsburgh Railways, Now in Charge of P.R.T. Supplies Department

B. J. Yungbluth, formerly store-keeper of the Pittsburgh (Pa.) Railways, has been appointed supervisor of purchasing and supplies of the Philadelphia (Pa.) Rapid Transit Company. In his new position Mr. Yungbluth will have charge of the purchasing, supplies and printing departments of the P. R. T. System. Mr. Yungbluth resigned his connection with the Pittsburgh Railways last January to become connected with the Mitten Management Corporation, Philadelphia, for which he has been engaged during the past few months in a study of the general subject of materials and supplies. His new appointment took effect on Oct. 1.

B. J. YUNGBLUTH

Mr. Yungbluth was born on August 29, 1882, in Marquette, Mich. Upon leaving high school in 1899, he entered the employ of the Duluth, South Shore & Atlantic Railway, at Marquette. After serving in various capacities in the stores department for about a year, he entered the purchasing department of the Mineral Range Railway, at Hancock, Mich., where he acted as accountant and store-keeper until 1905. He then resigned to become chief clerk to the general store-keeper of the Lake Shore & Michigan Southern Railway at Cleveland, Ohio. Under the same management he served for three years as store-keeper of the Lake Erie & Western Railroad at Lima, Ohio.

Leaving the steam railroad field in 1910, Mr. Yungbluth entered the employ of the Pittsburgh Railways, where he served on the general manager's staff as general store-keeper for ten years. Under his direction the stores department, which had up to that time received little attention, was completely reorganized and was put on a sound basis. Mr. Yungbluth was one of the first to apply steam railroad methods of store-keeping to the electric railway field. As a result of his efforts the stores department of the Pittsburgh Railways is recognized as one of the best of its class in the country. Mr. Yungbluth has contributed a number of articles to the ELECTRIC RAILWAY JOURNAL dealing with the efficient handling of problems arising in this branch of the service.

George W. Bowie has resigned as superintendent of transportation of the Augusta Division of the Androscoggin & Kennebec Railway, Lewiston, Maine.

M. L. Ross has resigned as president and superintendent of the Vincennes (Ind.) Traction Company. Mr. Ross has announced no plans for the future. He began his railway experience in 1906 as timekeeper with the Jackson Railway & Light Company, Jackson, Tenn.

Ivy L. Lee has been retained by the board of directors of the Pennsylvania Railroad to act in an advisory capacity in matters of publicity and public relations. In the conduct of this work Mr. Lee will report to the president and the vice-president and will co-operate with the publicity department of the company.

William H. Clarke has resigned as a vice-president of the Byllesby Engineering & Management Corporation, Chicago. Mr. Clarke has been identified with the Byllesby organization for a number of years, his duties being connected for the most part with the bond department. He will continue in the investment banking field.

Joseph A. Phelan, formerly manager of the Gloucester Division of the Eastern Massachusetts Street Railway, Boston, Mass., has been appointed general superintendent of the Rockford City Traction Company and the Rockford & Interurban Railway, Rockford, Ill. Mr. Phelan succeeds C. R. Simcox, resigned. He was born at Lynn, Mass., on July 13, 1886. He began his traction experience as a conductor in the employ of the Bay State Street Railway, then the Boston & Northern Street Railway, in 1904. In October, 1906, he was appointed night operating foreman of the West Lynn carhouse and was subsequently promoted to inspector. In the fall of 1917 he was assigned to the office of the traffic department at the main office of the company in Boston, and in February, 1918, was promoted to chief inspector of the Bay State System. On July 7, 1918, he was appointed superintendent of the Quincy Division.

Philip H. Gadsden Heads American Association

William G. Gove Elected President of Engineering Association—Ray P. Stevens, Traffic and Transportation— J. J. Landers, Accountants'—John J. Reynolds, Claims

The new presidents of the American Electric Railway Association and its affiliated organizations, elected at the recent meeting in Atlantic City, are all well known to the industry at large, in which all of them have been active for many years. This is particularly true of Mr. Gadsden, whose work has long been of a national character. As regards the officers of the affiliated associations, however, their work naturally has come more particularly to the attention of the members of the associations with which they are immediately affiliated. On account of the significance of the positions to which Messrs. Gadsden, Gove, Stevens, Landers and Reynolds have been advanced and the need which goes with each office for co-operation with the other affiliated bodies, it has been deemed expedient to review the careers of all of the new presidents, both inside and outside of the industry. The portraits of all of the new presidents were published in the Convention Report Issue of the ELECTRIC RAILWAY JOURNAL, with the exception of that of John J. Reynolds of the Claims Association.

PHILIP H. Gadsden is president of the Charleston Consolidated Railway & Lighting Company, Charleston, S. C. A year ago Mr. Gadsden, after serving as chairman of the American Electric Railway War Board, was elected vice-president of the United Gas Improvement Company, Philadelphia. In this capacity he took charge of a new department of national public relations of that organization. The United Gas Improvement Company is owner and operator of a number of public utilities throughout the country, including railway, gas and power properties. The establishment by such an important company as the U. G. I. of a public relations organization under a vice-president, and his appointment to that office, should be of great assistance to Mr. Gadsden in the work to which he has put his hand in helping to improve the status of utilities.

Mr. Gadsden represented the American Electric Railway Association on the Federal Electric Railways Commission. Mr. Gadsden himself was largely responsible for making the commission's report of assistance to those trying to adjust relations so that railways may function properly. He is now chairman of the committee on national relations of the national association.

Mr. Gadsden was born in Charleston fifty-two years ago. He was educated in the public schools of that city, and afterward in the South Carolina University, at Columbia, which university has conferred upon him the degree of Doctor of Laws. A man of broad reading and experience, Mr. Gadsden is professionally a lawyer, and has practiced at the bar for fifteen years. He was a member of the South Carolina Legislature for six years, elected by the people for three successive terms. He is one of the charter members of the League to Enforce Peace, and is given credit for putting the word "Enforce" in its name, without which the league would have merely the title of a pacifist organization.

As a consequence of his work in behalf of public utilities during the war, Mr. Gadsden is constantly being sought to make speeches, and because of the national prominence he has attained in his study of the difficulties of public utilities, he is now being urged to explain these difficulties by writing articles for publication in popular magazines.

William G. Gove, elected president of the Engineering Association, is superintendent of equipment for the Brooklyn (N. Y.) Rapid Transit System, and engineer of car equipment for the New York Municipal Railway. He has been identified with the Engineering Association since its inception and was largely responsible for the work of its organization. After leaving college Mr. Gove began work in civil engineering on irrigation projects on the Pacific Coast. In July, 1896, he became assistant engineer of roadways for the Cincinnati Street Railway, and in March, 1899, joined the force of the Boston Elevated Railway as an assistant engineer.

From January, 1900, to May of the same year, Mr. Gove had charge of the construction and equipment of the trial trains that were used in a competitive test in the old Tremont Street subway, Boston. These tests of train operation mark an epoch in electric railway development as pointing the way to train operation with multiple unit equipment. After the tests had been completed and a decision reached as to the type of equipment to be used, Mr. Gove drew up the specifications and worked up the designs for the first elevated cars used in Boston. Later he was associated with Messrs. Winsor and Lindall in the construction and equipment of additional cars for their service.

In June, 1903, Mr. Gove joined the Brooklyn Rapid Transit Company as assistant mechanical engineer, and in December, 1905, he became superintendent of equipment for that company.

In April, 1913, he had the duties of engineer of car equipment of the New York Municipal Railway added to his duties of superintendent of equipment for the Brooklyn Rapid Transit Company. The design, construction, and equipment of the new subway cars for use by this corporation were carried out under Mr. Gove's direction. This type of subway car has proved most efficient in the handling of passengers in a very exacting service, and their construction embodied many new features. The reputation of this car has traveled around the world, as is evidenced by its influence on the new London underground cars and those proposed for the Sydney suburban electrification. The New York Municipal Railway has now provided 900 of these cars at a total cost of $18,000,000 and the necessary reconstruction of shops and equipment to take care of their maintenance cost several millions more.

Mr. Gove is probably best known among his railway associates for devotion to the standardization of equipment, and the far-reaching results which he has accomplished in this direction for his company. This enthusiasm for standardization was reflected largely in the work of the committees of the Engineering Association with which he was then connected, and the early start which this association has made in standardization and the far-reaching results which have already been accomplished are largely due to Mr. Gove's untiring efforts.

In addition to the work of standardization, Mr. Gove was a pioneer in adopting steel wheels for electric railway service. At present the B.R.T. has 50,000 steel wheels on its system, which is by far the largest number in use by any electric railway property. Mr. Gove has consistently advocated the use of steel wheels for electric railway service, and the adherence to the association standards as adopted, and today he has no other wheels in use but those of association standards.

As a member and official of the Engineering Association, Mr. Gove has participated in the work of many of its committees. In addition to his work with the American Electric Railway Association, Mr. Gove is a member of the executive committee of the New York Electric Railway Association and chairman of its committee on equipment. He is also an active member of the American Society of Civil Engineers.

Ray P. Stevens, who heads the Transportation & Traffic Association, is president of the Republic Engineers, Inc., New York City, of the Pennsylvania-Ohio Electric Company, Youngstown, Ohio, and the Youngstown Municipal Railway Company, and is vice-president of the Republic Railway & Light Company and a member of the executive committee of the Cleveland Electric Illuminating Company. He has been prominent as a railway operator and executive for the past twenty years, and during this time he has been called several times from one property to another, each time to assume more responsible duties.

Mr. Stevens was born in Maine in 1877. He was graduated from the University of Maine with the degree of Bachelor of Electrical Engineering in 1898. He immediately engaged in work for the Bell Telephone Company, later for the General Electric Company, and then in consulting engineering work in Chicago. His first electric railway connection was in consulting work at Everett, Wash., where he practically built an entirely new railway and power and light system, including power house and shops. Before he had finished this work he was persuaded to take charge of the railway and lighting properties in Everett, and under his management the earnings doubled in less than five years.

He next went to Auburn, N. Y., as general superintendent of the Auburn & Syracuse Electric Railway and the Auburn & Northern Electric Railway and as manager of the Skaneateles Lake Transit Company and remained there two years. His record during this short period was so notable that in 1907 he was offered and accepted the presidency of the Lehigh Valley Transit Company at Allentown, Pa., which company controlled at that time about 150 miles of track and practically all the light and power properties in the Lehigh Valley. He was then but thirty years old. Mr. Stevens' connection with this company lasted six years, when he resigned to join the Youngstown and New York properties, with which he is now connected. Mr. Stevens was president of the Pennsylvania Street Railway Association for two years and has always taken an active part in national association affairs.

J. J. Landers, elected president of the Accountants' Association, has been connected with public utility undertakings for the greater part of his business career, mostly in accounting work. Mr. Landers was born in 1876 in Bucks County, Pa. At an early age he removed to Philadelphia. He received his education at St. Joseph's College and shortly thereafter entered the employ of the Philadelphia Traction Company, later the Union Traction Company, as chief clerk to the superintendent of power. This position he held until 1899, when he went to Scranton as the chief clerk in the auditing department of the Scranton Railway. In 1903 he was appointed cashier of the Conneaut & Erie Traction Company, then under construction. When operations started he assumed the duties of treasurer and manager. In 1905 he was appointed superintendent of the Rock Hill (S. C.) Light & Water Company, and after two years in the South returned to Pennsylvania as auditor for the York Railways and subsidiaries. Mr. Landers has served three terms as a vice-president of the Accountants' Association and this election is a promotion from the office of first vice-president.

John J. Reynolds, the new head of the Claims Association, is claims attorney of the Boston Elevated Railway. Mr. Reynolds is a native of Massachusetts. He received his early education in the Boston public schools and was later graduated from the Northeastern College School of Law. In 1902 he was admitted to the Massachusetts Bar and soon thereafter to membership in the American, Massachusetts and Boston Bar Associations.

His experience in railway work dates from his connection with the Boston Elevated Railway and its predecessors in 1885. He began as a horse-car driver and then became a driver and conductor on a coach line and later a starter. With the introduction of the electric car he became a motorman and during the rapid growth of the electric lines worked for about a year in the shop as a motor-car and wire repairman, after which he was appointed instructor of new motormen.

As soon as the electric railway was firmly established, Mr. Reynolds held successively positions as inspector, investigator and adjuster in the claims department, and then became claims attorney in 1902. Various offices of the Claims Association have been held by Mr. Reynolds and during his membership he has contributed to the association papers on the following subjects: Uniformity in claims department records, accident reporting by car crews, training of men for car service, benefits of publicity, mechanical devices for prevention of accidents (in collaboration with M. P. Spillane), near-side stops, guides for claim agents, the importance of operating rules, the Claims Association, etc.

J. J. REYNOLDS

Daniel Connors has been appointed superintendent of the Weymouth and the Hinghman-Hull Divisions of the Eastern Massachusetts Street Railway, Boston, Mass.

Guy McCallum has been appointed auditor of the Lowell Division of the Eastern Massachusetts Street Railway, Boston, Mass. Mr. McCallum was formerly connected with the main office of the railway in Boston.

Harrah K. Bennett, general claim agent of the Eastern Massachusetts Street Railway, Boston, Mass., has been appointed manager of the newly created Melrose-Woburn Division of the company. This division comprises the cities of Melrose and Woburn and a number of neighboring towns. The position of general claim agent has been abolished, and the duties of that office will be performed by the legal department of the railway.

Floyd W. Parsons, who conducts the department "Everybody's Business" in the *Saturday Evening Post*, discussed the public utility situation in the issue of that paper for Oct. 9. Mr. Parsons is particularly well qualified to deal with a subject of this kind on account of his wide knowledge of engineering and industry. Before becoming connected with the *Post* he was editor of *Coal Age*, one of the papers included with the ELECTRIC RAILWAY JOURNAL under the McGraw-Hill management.

L. P. Hockett, for the past two years auditor and accountant of the Utah Utilities Commission, has resigned to accept a position with the Public Service Commission of the state of Washington. The attention of the Washington Commission was attracted to Mr. Hockett's work by his efforts to obtain betterments in the accounting systems of public utilities. He was instrumental in bringing about a recent conference at Boise, Idaho, attended by representatives of the accounting departments of the Washington, Oregon, Montana, Idaho and Utah commissions, at which a uniform system of accounting to be put into effect in the various states represented was taken up. Mr. Hockett joined the Utah Commission soon after his discharge from the Signal Corps of the United States Army. Previous to the war Mr. Hockett had spent many years in various branches of railroad service.

Obituary

Elisha S. Williams, vice-president of the United States Rubber Company, died on Oct 8. Mr. Williams was born in Malden, Mass., in 1873. He became vice-president five years ago.

J. M. Means, assistant superintendent of transportation of the Georgia Railway & Power Company, Atlanta, Ga., was shot and instantly killed on Oct. 12 by a conductor whom he was reprimanding for infraction of company rules. This conductor, after attacking Mr. Means, shot himself, but not fatally.

Elvin L. McGrew, purchasing agent and general traffic manager of the Standard Underground Cable Company, Pittsburgh, Pa., died on Oct. 8 in New York City. Mr. McGrew was born in New Alexander, Ohio He began his business career as a telegraph operator, and after entering the service of the Pennsylvania Railroad, became freight agent at New Cumberland, W. Va., where he remained four years. In 1900 he became connected with the Standard Underground Cable Company. He was a leader in the formation of the Purchasing Agents' Association of Pittsburgh and was its first president.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER, SALESMAN AND PURCHASING AGENT

ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Insulation Prices Reflect Lower Cotton

Demand Has Slackened, but Good Business Is Seen for Next Year—Prices May Go Lower

Lower prices of raw material have reacted upon the market for insulation of all kinds, according to representative manufacturers in this line and jobbers. The price of tapes, webbing, sleeving, cambric, both varnished and plain, and silk material has dropped slightly owing to lower cotton. Varnish, too, is a little easier in price. On the other hand, insulating papers, pressboard, etc., show no signs of a reduction, and in some quarters it is said that even higher prices may prevail there in view of the great scarcity of paper. No fluctuation is evident on mica. Opinions differ as to the probable tendency of prices on that material. One distributer reports that prices quoted from England are being slightly shaded, but on the other hand it is said that European countries have entered into competition as buyers of mica in India so strongly that the supply does not exceed the demand. One large company which does considerable business in built-up mica used in fractional motors and automobile ignition sets states that there is little or no demand from that quarter.

FURTHER PRICE TREND UNCERTAIN

Questioned whether or not insulation prices have reached their bottom level most manufacturers state that the trend is almost entirely dependent upon raw material prices. It is pointed out in some cases that cotton has been contracted for some time in advance and that it requires from about eight to ten weeks before a drop in raw cotton is reflected in prices of finished insulation. For this reason some producers state that if cotton remains at its present low level or drops further some additional softening of prices may result, but this readjustment will come about gradually if at all. Demand, while fair at present, is considerably less than it was a few months ago, probably owing to price uncertainties, it is said. Some cancellations have been received, but outside of the automobile industry these have not been alarming. There have been requests for extensions of time on filling orders in a number of instances, however. Manufacturers agree that the present dullness is only temporary and that a good volume of business should develop after the first of the year. This optimistic tone seems to be quite prevalent in the field. One of the large interests reports that in spite of the recent decrease in demand the present year will show a volume of business one-third greater than ever before. Even at present, though individual orders are smaller, this company reports that the actual number of orders and inquiries is increasing. The most active buyers of insulating material just now are said to be the repair shops, and cable manufacturers are also ordering varnished cambric fairly well. Foreign demand is conceded to be on the increase, and prospects for orders from abroad are brighter. Inquiries are coming in from England, France, Germany, Australia and the Scandinavian peninsula, it is said.

Raw material, except for paper, is plentiful, but not all producers have been able to catch up with back orders, which in one representative instance are still piled up one to three months ahead. Deliveries are improving, however, and on some classes of material orders can almost be filled from stock, it is stated.

Favorable Conditions in Car Wheel Market

Demand Good, with Bright Prospects for Future — Deliveries Are Improved and Prices Steady at Present, Though Trend Is Dependent Upon Raw Material

Demand for car wheels on the part of electric railways has been good and is well up to the standard of other years, manufacturers report. In some quarters sales to traction companies are said to be on the increase and the general tone of producers is optimistic. Prospects for 1921 business are held to be excellent. This view in large part is due to an anticipated buying movement from steam roads and to hopes of better financial conditions with street railways. As yet the effect of higher rates upon orders of car wheels by steam railroads has not been felt strongly, but manufacturers take an encouraging view of this situation and say it is still too early to expect definite results. One large producer is receiving more orders for replacements, however, though buying on behalf of new cars has not increased. The general tendency of electric traction companies has been to make their car wheels, both chilled iron and rolled steel, run a greater distance without making replacements, it is stated. This tendency is not now so evident, however.

Conditions of production are generally improved compared with the past summer, when one of the representative mills reported being frequently closed down because of a shortage of coal and coke. The shortage of cars added its depressing influence at that time so that orders piled up for sixty days and deliveries ranged in the neighborhood of three months. At present the supply of rolled steel and chilled iron wheels is reported favorable. In several cases a thirty days' reserve supply of wheels is kept on hand for regular customers and deliveries can be made in good time. One manufacturer's representative in the far West reports that orders from that territory can be filled in from thirty to sixty days. Furthermore, railways are anticipating their needs sufficiently to relieve the pressure of immediate delivery demands.

The supply of raw material is said to be much easier compared with a few months ago. Less complaint is heard of the coal and coke supply though existing prices in that line are considered high. There is, however, more or less of a scarcity of scrap wheels according to some wheel makers. These are very largely used in the manufacture of chilled iron wheels and during the war excess stocks of old wheels became depleted. Prices are holding steady and the opinion is quite generally expressed that quotations in this line have reached their peak.

Manufacturers seem to believe that present price levels will prevail for some time to come, but also add that some softening may be expected to follow, dependent upon the trend of raw material, coal, coke, wages, etc. Labor conditions in general are reported good, with an increasing tendency for more work to be accomplished per man in many instances. Cancellations, it is stated, have not been felt at all in the car wheel market.

Pittsburgh Railways Plans for 150 New Cars

Rehabilitation of the street car service in Pittsburgh is the object of a petition of the receivers of the Pittsburgh Railways to the United States District Court for permission to buy 150 latest model cars. The receivers, C. A. Fagan, W. D. George and S. L. Tone, plan to purchase 150 double-truck steel cars and other equipment, and also to build two new carhouses.

Purchase of the new cars will be on the allotment plan. The receivers, in their petition to the court, say that to carry out their plan 150 cars will be required, but for immediate use they need twenty-five. The receivers called attention of the court to the fact that since Jan. 1, 1920, they have been setting aside each month from the revenues of the system the sum of $25,000, which they regard as a very conservative amount, as a reserve fund for the purchase of cars.

"In view of the delays we have encountered in connection with the purchase of 150 additional cars," declared C. A. Fagan, "we have decided that it will not be best to delay commencing purchase of cars until we are able to purchase the full 150, but we recommend that twenty-five of this number be purchased immediately, paying for them out of the fund we have created in order that the equipment may be increased and improved to that extent. By obtaining bids we have found that we can purchase twenty-five double-truck, low-floor steel cars, each equipped with four motors, air brakes, heaters, fare boxes, etc., to be built immediately, at an aggregate cost of $375,000. This amount we can pay out of our reserve fund."

The program outlined by the receivers includes the first two of a number of new carhouses, replacing with new material all old trackage throughout the system, and a new system for cleaning cars in line with the receivers' plan for a perfect sanitary condition besides other important changes.

Wire Prices Closely Follow Raw Material Trend

Buying Is Light on Falling Market—Stocks Are Not Large and Deliveries Cover Wide Range

Demand for copper wire, both bare and insulated, is at a low level at present, according to manufacturers. This condition is attributed to the falling market, which automatically curtails buying until price readjustments are completed. Foreign demand is also light at present, though the exchange situation is partly to blame there. In some quarters it is stated that manufacturers are curtailing production in order to guard against overstocking.

As a result of lower cotton, rubber and copper prices, there has been a general easing off of prices on the whole line of bare and insulated wire. This reduction has been gradual and varies according to type and size. One producer estimates the extent of the price drop to be from about 10 to 15 per cent. Opinions differ as to whether prices have reached their lowest level. In many cases manufacturers have contracted in advance for cotton. Copper prices are also held to be close to the margin of producing cost. In view of these facts one large wire producer at least is buying copper at the present time. On the other hand, a great many interests seem to feel that still lower wire prices may prevail, provided that raw materials remain at their present level or drop further. This view holds that lower raw-material cost, especially of cotton, has not yet had time to make itself felt fully. Bare wire base at present ranges from about 20 cents to 20¾ cents, compared with about 22½ cents two months ago.

In general the view is expressed that demand will remain light for the rest of this year, but that starting next spring a good volume of business will develop. Buying may even start heavily before then, one manufacturer says, if copper and cotton should start to move upward. In the opinion of this company, a rush to place orders would then ensue that would tax the capacity of wire mills and leave many consumers who have waited "out in the cold."

FEW CANCELLATIONS RECEIVED

A number of cancellations and requests for extensions have been received, especially from automobile manufacturers, but outside of that industry the number does not seem to be great. The chief reason for cancellations is felt to be the overbuying that has taken place in an effort to insure deliveries. Stocks, on the whole, are not large. One company has unfilled orders ahead for three months on certain sizes of weatherproof wire, and another is quoting deliveries of from six to twenty weeks on some sizes of insulated wire and four to six weeks on bare. Many sizes are available from stock, however. Magnet wire stocks are generally short and deliveries cannot be made from stock. One representative producer is quoting eight to ten weeks. Another manufacturer presents the exception to the rule by reporting a good stock of fine insulated wire but a short supply of the large sizes, which in that case are meeting a stronger demand.

Prices generally are very unstable and, as one manufacturer puts it, are "all over the lot." No prices can be quoted on going to press which can reasonably be expected to hold over publication date.

Further Encouraging Word from St. Louis Car Company

Further word received from the St. Louis Car Company states that the company is not out of production, but is still building cars, as the capacity of the plant is but partially and temporarily interrupted. As stated in last week's issue the main car building section of the plant was saved. The lumber stock, dry kilns, foundries and foundry machine shops, automobile plant, west side mill, cabinet and erecting shops, tool room and stores department were not damaged, thus enabling partial production to be resumed immediately and which is expected to increase daily. The plant is resuming operation on three shifts of eight hours each, it is announced.

Rolling Stock

St. Petersburg & Gulf Railway, St. Petersburg, Fla., mentioned in the June 12 issue as ordering eight safety cars, has been promised delivery sometime during this month, it is announced. A strike delayed the fulfillment of the contract.

Twin City Rapid Transit Company, Minneapolis, Minn., will put twelve of the 300 cars being changed over to the front exit type, as announced in the Sept. 11 issue, into operation on Nov. 1 it is announced. The remainder will be in service by Jan. 1, it is said.

The Salt Lake & Utah Railroad, Salt Lake City, Utah, has recently put into service on its lines, thirty-six new open cars of an order of fifty, it is announced. The company has also secured the use of forty-five cars belonging to the Nevada Copper Belt Railroad, during the beet-hauling season which is now on.

United Railways of St. Louis, Mo., lost fifty trailers, valued at $8,412 each in the recent fire at the plant of the St. Louis Car Company, it is announced. The car parts had been completed in the fabricating plant and were ready for assembling. Deliveries of two cars a day were intended to have begun next month. The program of the Public Service Commission which recently ordered the United Railways to add six cars a week to its equipment beginning Nov. 1, may now have to be held up for six months it is thought.

Georgia Railway & Power Company, Atlanta, Ga., besides the fifteen new center entrance cars placed in operation last spring, announces that it has 27 more in process of construction, divided among fifteen city, eight suburban and four interurban cars, the latter of which are for service on the Marietta line. The cost is said to be $11,937.87 each, compared with about $4,000 for the same cars some six or eight years ago. The company hopes for delivery to be made in the course of the next two or three months when the cars will be put into service.

Recent Incorporations

North Carolina Lines, Inc., Charlotte, N. C.—The North Carolina Lines, Inc., has been formed for the purpose of constructing an interurban line from Charlotte to Winston-Salem. The company is headed by Harry F. Hann, Winston-Salem. It has a tentative capital stock of $500,000.

Track and Roadway

New York State Railways, Syracuse, N. Y.—There will be an early hearing by Public Service Commissioner Frank Irvine on the petition of the New York State Railways for permission to construct in Milton Avenue and on private right-of-way in Solvay loop tracks connecting with the main line and for approval of a local franchise given by Solvay. The loop track, it is understood, is for the use of employees of the Solvay Company.

New York State Railways, Rome, N. Y.—The Public Service Commission, Second District, has granted permission and approval to the New York State Railways to construct and operate an extension in Rome consisting of a single track line to connect with the present line in Expense Street at Thomas Street northerly along Expense Street, westerly in Bloomfield Street and north on Kent Street to Elm Street. The commission also approved the franchises which were granted by the city officials. There was no opposition to the company's application at a hearing before Commissioner Frank Irvine who holds that the construction of the extension and exercise of the franchises are necessary for the public service.

International Railway, Buffalo, New York.—Application has been made by the International Railway to the town board of Tonawanda for permission to construct, maintain and operate an additional track along the River road from the Buffalo city line to a point near the Wickwire-Spencer Steel Company's plant, a distance of 6,068 ft. The International now operates a line along the River road to the new frontier industrial district but increased traffic warrants the double tracking of this line. The City Council of Buffalo will oppose the application when it comes before the Public Service Commission on the ground that there is more urgent necessity to improve existing lines in Buffalo than to double-track a stub interurban line.

Trenton, Bristol & Philadelphia Street Railway, Philadelphia, Pa.—The Trenton, Bristol & Philadelphia Street Railway has been requested by the Borough Council of Tullytown, Pa., to relocate its tracks through the entire town in order that the State Highway Department might lay a concrete pavement for a distance of 7,180 ft. The railway will bear the expense of the relaying of the tracks from the middle to one side of the street.

Salt Lake & Utah Railroad, Salt Lake City, Utah.—The Salt Lake & Utah Railroad, an electric line, which operates between Salt Lake City and Payson, Utah, has built four new spur tracks to take care of the shipping of sugar beets this season over the company's lines.

Bamberger Electric Railroad, Salt Lake City, Utah.—Work upon the complete double tracking of the Bamberger Electric Railroad between Ogden and Salt Lake City has been begun by the company. Work upon that part of the line between Ogden and the site of the new U. S. government arsenal at Sunset, which is about six miles, is being rushed in order to handle the heavy traffic in connection with the construction and operation of this plant.

Trade Notes

The Ohio Brass Company, Mansfield, Ohio, announces that D. McLaughlin who has been superintendent of the Michigan Railways for several years, has joined the service organization of the company and will devote his attention principally to car equipment material.

C. J. Logan, for twelve years connected with the Railway Audit & Inspection Company, Inc., Philadelphia, Pa., announces the organization of "Logan Service," of which he is president. Mr. Logan will continue this new company for the handling of "service" to railway properties and industrial corporations.

The American Gear Manufacturers' Association, anounces that as standardization and costs are closely related, these will be the pricipal subjects discussed at its semi-annual meeting to be held at Mohonk Lake, N. Y., Oct. 27, 28 and 29. Among the speakers will be P. G. Agnew, secretary of the American Engineering Standards Committee, whose subject will be "Standardization from the Point of View of the American Engineering Standards Committee"; Calvin W. Rice, secretary of the American Society of Mechanical Engineers, who will speak on "Standardization"; C. L. Collens, II, president of the Reliance Electric & Engineering Company and past president of the Electric Power Club, whose subject will be "Industry Organization," and Christopher Haigh, supervisor of costs, General Electric Company, who will describe the "Machine Rate Method of Distributing Expense." At an informal banquet to be held Thursday night, Oct. 28, Charles W. Woodward, vice-president in charge of personnel for the Hydraulic Pressed Steel Company, will be the pricipal speaker, taking as his subject "The Human Element in Industry." The American Gear Manufacturers' Association is making rapid strides in standardization and has received requests from Canada, England and Australia for copies of standards and recommended practices for the gear industry.

American Car & Foundry Company recently announced from its New York office that as part of its plan of extension in the Buffalo District, W. H. Sanford, for many years district manager of its Buffalo plants, had been appointed assistant vice-president and would be placed in charge of sales in that vicinity. Prior to the formation of the American Car & Foundry Company, Mr. Sanford was employed by the Union Car Company. When that company was absorbed he was appointed paymaster and cashier at the Depew plant. In 1902 he was appointed local auditor of the Buffalo district followed by promotion to the position of resident representative. Later, in 1912, he was made district manager in charge of the Depew as well as the Buffalo Plants.

Mr. Sanford will be succeeded as district manager by Andrew H. Gairns, now occupying a similar position with the company in Chicago and who has had an extended experience in steel car work and locomotive building. Announcement was made at the same time that the company's new plant now under construction in Buffalo will be used for building all-steel cars, with a capacity for turning out twenty to thirty cars per day. It will be equipped with the most modern machinery and labor-saving devices known. In addition to the new car-building plant a modern up-to-date office building will be erected on property recently acquired across Babcock Street. The soft foundry at the Buffalo plant has been completely re-equipped and is now engaged in quantity production. The Niagara Wheel Department has also been brought up to a high state of efficiency. The car company's plans thus outlined involve a total expenditure of $3 500,000.

New Advertising Literature

Car Seats.—Hale & Kilburn Corporation, New York City, has issued a folder announcing its "Duplex Reversible Seat," which is designed for light cars.

Insulated Wire.—The Standard Underground Cable Company, Pittsburgh, Pa., has recently issued a forty-page bulletin describing its lines of insulated wire.

Motorman's Seat.—The J. G. Brill Company, Philadelphia, Pa., has issued bulletin No. 249, which describes and illustrates its new motorman's seat for standard Birney safety cars.

Hoists.—Sprague Electric Works, New York City, is distributing bulletin No. 48961 on type W, floor controlled hoists in capacities of 1 to 6 tons, both direct and alternating current.

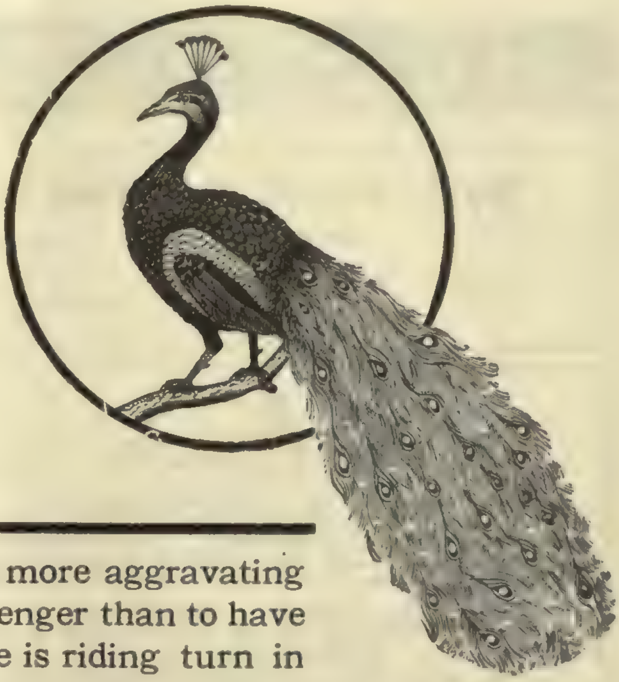
Safety Cars.—The J. G. Brill Company, Philadelphia, Pa., is distributing publication No. 250, entitled "A New Point of View," which discusses editorial opinions of Birney Safety Cars.

Engineering Service.—Ford, Bacon & Davis, engineers, at 115 Broadway, New York City, have published a booklet called "Strength in Union," dealing especially with their valuation and report department.

Clamshell Buckets.—Blaw-Knox Company, Pittsburgh, Pa., is distributing two folders, one dealing with the "Blaw Bulldog Bucket," and the other with "lever arms, rated capacities and S-bends" as related to lever arm buckets.

Welding Apparatus.—The Bastian Blessing Company, Chicago, Ill., is distributing catalog No. 20, on "Rego" welding and cutting apparatus, with a booklet enclosed which is entitled, "A New Principle in Welding and Cutting Apparatus."

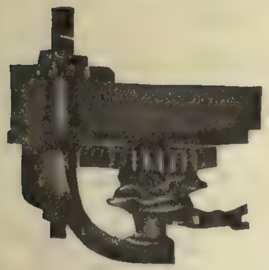
Peacocks keep your cars in service when you need the cars most.



The Peacock Staffless

There is nothing more aggravating to the average passenger than to have the car on which he is riding turn in at the car barn and have the conductor ask him to change cars. Often this does occur on account of bad brakes but with your cars equipped with Peacock Brakes you can continue this car in service.

Equip your cars with PEACOCKS



The Peacock Type G

Give them the little attention they need to be kept in first class condition and you have brakes which will return you more dollar for dollar than any other one item of your car equipment.

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All of our plants have adequate facilities for fitting wheels to axles

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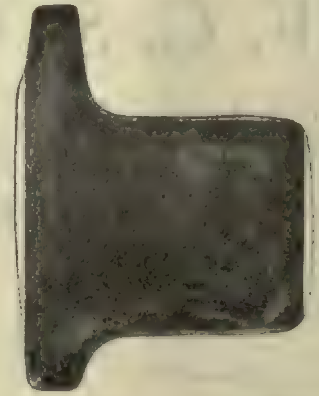
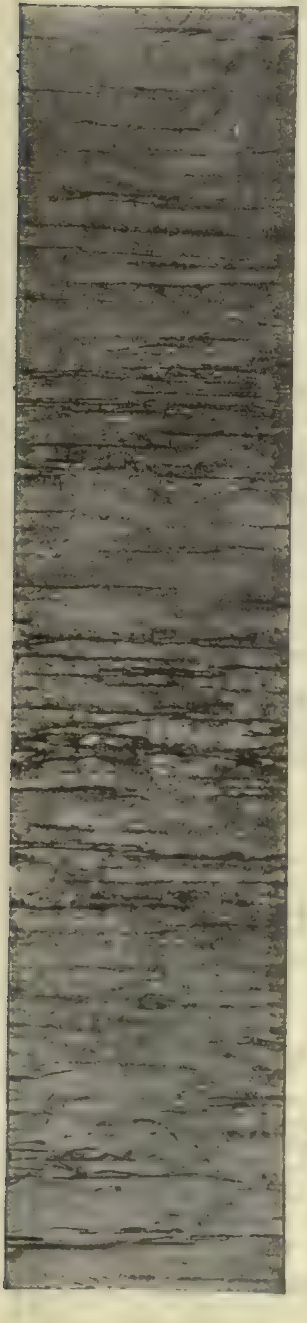
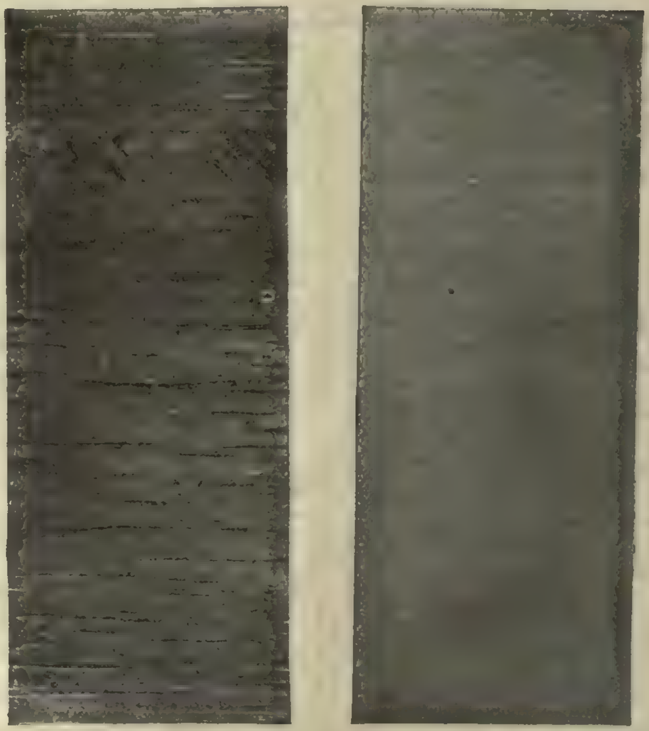
When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

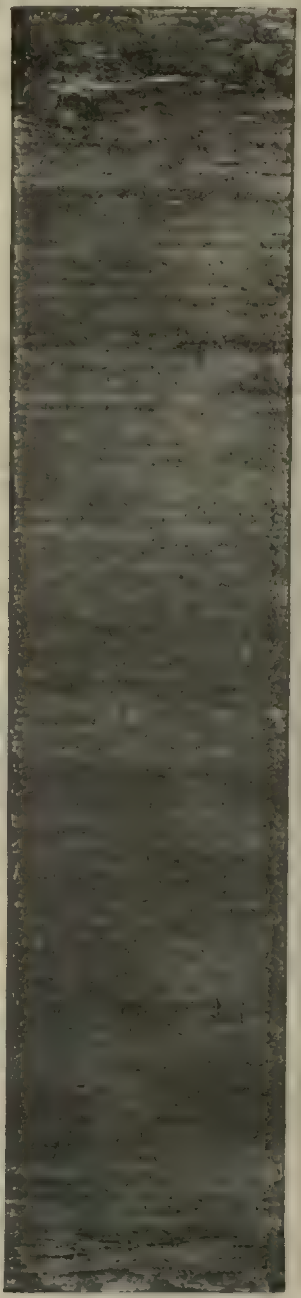
Here's good evidence that the LACKAWANNA DESEAMING PROCESS improves rail quality

These pictures of etched surfaces of a partially rolled rail bar at the location of the head and rail indicate clearly the condition of the rail bar just before and just after application of the Lackawanna Deseaming operation. This removal of the defective surface comes at a period in the rolling process when the hot rail bar is approximately 75 per cent. finished—that is, after the ingot has been bloomed down to an 8-inch by 8-inch cross section by the blooming rolls, after the end has been cropped and the bloom further reduced by five, more or less, passes on which is known as the roughing or shaping stand of rolls. A









At the top, center, cross section of 75 per cent finished rail bar, immediately after passing through the saw, and indicating by the dotted lines the amount of metal removed by the Lackawanna Deseaming Process.

At the left, full sized section base and head of the bar etched to show the surface seams that exist before milling off the surface metal.

At the right, head and base of the same bar, immediately after treated by the Lackawanna Process. Etched to show the improved condition of the surface metal.

ALL LACKAWANNA RAILS ARE DESEAMED

machined, polished and etched end section of a bar at this stage of the rolling operation would clearly show the well-defined enevelope of weak, partially decarburized metal 3/32 inch to 5/32 inch in depth. The small end section herewith does show this weak metal faintly at the surfaces not touched by the Lackawanna Deseaming miller. If allowed to remain, this inferior metal does not lose its identity during the rolling operation, even to the finished product. The portions of the head and base of the same cobble etched to show the appearance of the seams and laminations tell the story. At this stage in the rolling operation, a rail bar containing four 33-foot rails is about 60 feet in length, and the area of metal which it is desirable to remove is 7 inches in width at the base of the bar, 4 inches in width on the top of the bar, and in both places about ⅛ inch in depth.

The improvement in the head and base metal just after passing through the deseaming saws, as shown in the right-hand corner, is typical of the condition of the whole length of the bar. Five or more subseqeunt rolling operations then further reduce the bar to the finished section, thereby completing the important finishing operations on clean, dense, hard metal of the greatest strength.

This assures a rail head far better able to withstand abrasion and sloughing under constant heavy traffic and heavy wheel loads, and a rail base without any fissures or weakness that can spread under the heaviest of transverse stresses.

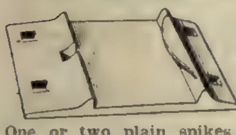
If the many economies of better rail service interest you, tell us what rail sections and wheel loads you have and our engineers will advise you in detail what you can gain by using Lackawanna Deseamed Rails. ALL LACKAWANNA RAILS ARE DESEAMED.

Other Lackawanna Aids to Better Track

The Lackawanna Safety-Head Angle Bar

overcomes liability to wear and fracture by preventing cutting of the bar at the top from back action or upward thrust of the rail ends. This is accomplished by a slight depression in the head of the angle bar for a short space at the center where the rail ends meet.

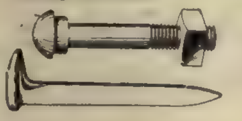
The Lackawanna Hook-Shoulder Tie Plate



is simple, strong, durable, convenient for installation, and by holding the rail with great security prevents undue wear and destruction of material, saves repair costs and reduces maintenance labor.

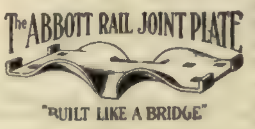
Two ribs on top form a channel in which the rail base rests. One of the ribs is plain and the other hooked to make a holder. One or two plain spikes on the plain rib complete the bond between plate and both rail flanges. The plate is fastened to the tie by independent plain or screw spikes. The rail may be removed without disturbing the plate.

Lackawanna Track Bolts and Spikes



Our track bolts and spikes of all standard sizes for light or heavy rails, enjoy an enviable reputation for careful, accurate workmanship and finish.

The Abbot Rail-Joint Plate


The ABBOTT RAIL JOINT PLATE
"BUILT LIKE A BRIDGE"

strengthens and otherwise improves ordinary angle bar joints of standard and light tee and girder rails. Its use assures smooth running track surface without the necessity of constantly raising and tamping the joint ties, avoids annoyance and expense from worn and broken bolts and angle bars and protects the rail ends from battering and breaking down.

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Abbott Plates are equally applicable to and advantageous on new or relaid track and will extend the life even of old track for several years.

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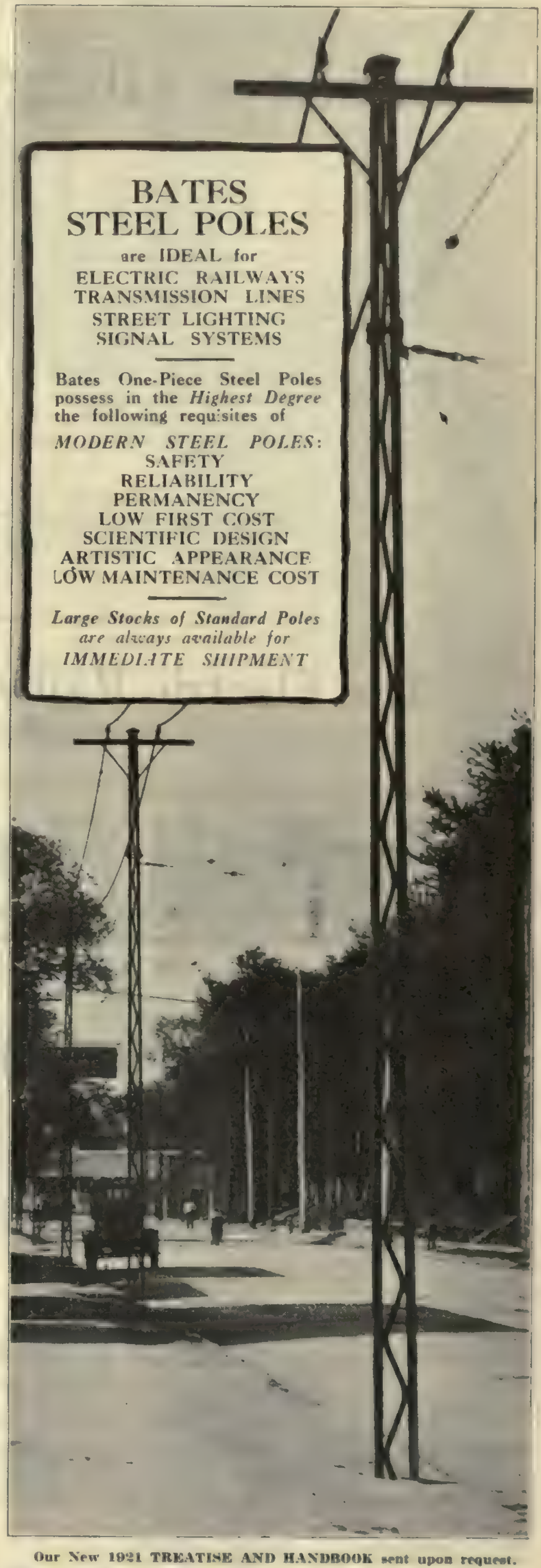

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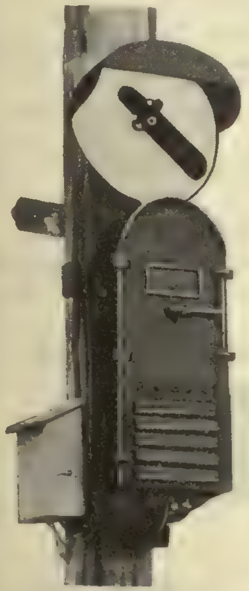

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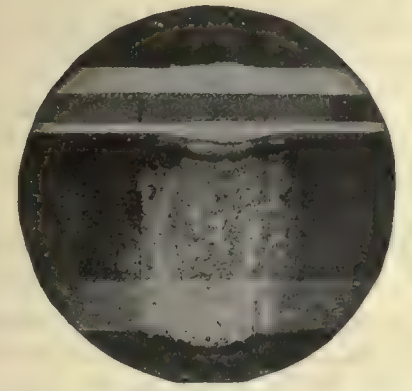

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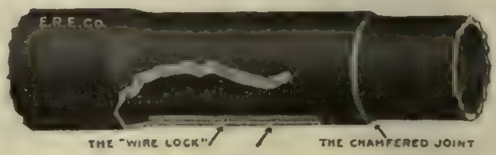

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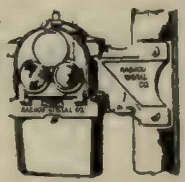
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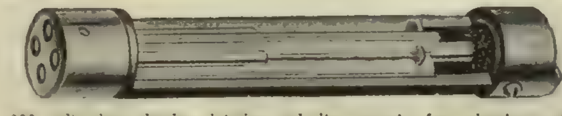

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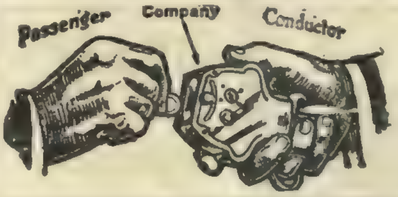

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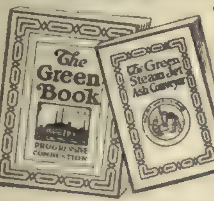
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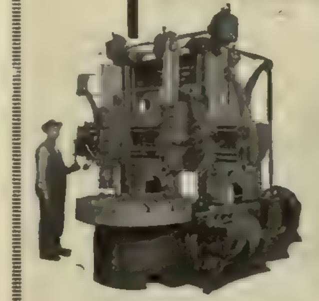

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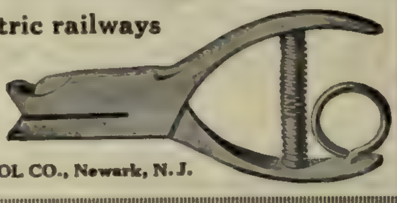

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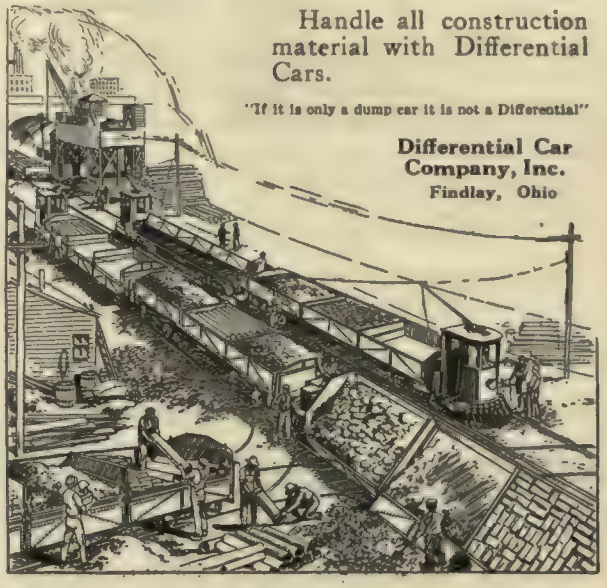

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PROVIDENCE FENDERS **H-B LIFE GUARDS**

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Wendell & MacDuffie Co., 61 Broadway, New York
General Sales Agents

Use them in your terminals—
PEREY TURNSTILES or PASSIMETERS
Faster than the ticket seller
Perey Manufacturing Co., Inc.
30 Church Street, New York City

SAMSON SPOT WATERPROOFED TROLLEY CORD

Trade Mark Reg. U. S. Pat. Off.
Made of extra quality stock firmly braided and smoothly finished. Carefully inspected and guaranteed free from flaws. Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

"UNION" FUSES

"Union" Renewable Fuses will save four-fifths of your fuse maintenance cost. Guaranteed to give satisfaction. Money back if they fail. Booklet on request.

CHICAGO FUSE MFG. CO.
Chicago New York

ELECTRIC RAILWAY JOURNAL

Think "SEARCHLIGHT" First

ADVERTISING RATES

POSITIONS VACANT—Business Opportunities and other undisplayed ads, 8 cents a word, minimum $2.00 an insertion.

POSITIONS WANTED—Evening work wanted, tutoring and other undisplayed ads of individuals looking for employment, 4 cents a word, minimum 75 cents, payable in advance.

ADD 5 WORDS for box number in undisplayed ads if replies are to any of our offices. There is no extra charge for forwarding replies.

DISCOUNT OF 10% if one payment is made in advance for 4 consecutive insertions of undisplayed ad.

ADS IN DISPLAY TYPE—Space is sold by the inch (30 in. to a page), the price depending upon total space used within a year, some space to be used each issue.

RATE PER INCH for ads in display space:

1 to 3 in.,	$4.50 an in.	15 to 29 in.,	$3.90 an in.
4 to 7 in.,	$4.30 an in.	30 to 49 in.,	$3.80 an in.
8 to 14 in.,	$4.10 an in.	50 to 99 in.,	$3.70 an in.

POSITIONS VACANT

EMPLOYMENT

POSITIONS WANTED

POSITIONS VACANT

EXPERIENCED traffic inspectors for Eastern City operating 100 cars. Good wages. Purchasing Agent, Trenton & Mercer County Trac. Corp., Trenton, N. J.

MASTER mechanic wanted for city and interurban property in the East. State age, experience and salary expected. P-771, Elec. Ry. Journ.

EXPERIENCED street railway armature winder. Steady work. Address, H. Mcnutt, care San Diego Electric Railway Company, San Diego, Cal., stating age, experience and salary expected.

SEVERAL draftsmen and computers wanted on frog and switch work with manufacturer. Experience unnecesary, but desirable. State minimum salary in letter. Steady employment. P-768, Elec. Ry. Journ., Real Estate Trust Bldg., Philadelphia.

POSITIONS VACANT

SPECIAL work foreman wanted for trolley work construction. State age, experience and salary desired. Location Middlewest. P-772, Elec. Ry. Journ.

EXPERIENCED electric and acetylene welder for electric railway work in Eastern city. P-770, Elec. Ry. Journ.

POSITIONS WANTED

PURCHASING agent, 12 years' experience, age 38, married, college graduate; best references. Would like to have personal interview. PW-769, Elec. Ry. Journ., Real Estate Trust Bldg., Philadelphia.

SUPERINTENDENT wants position; seven years' experience with one of the largest interurban railways in country; age 42; can furnish refrences. PW-773, Elec. Ry. Journ.

POSITIONS WANTED

HIGH-CLASS railway claim agent and safety expert, thoroughly qualified in all branches of claim department management and operation, desires connection with progressive company. PW-767, Elec. Ry. Journ.

MANAGER—Position as manager desired. Experience with large properties. Broad education; good address; capable of dealing with public and public officials, and handling laboring men. Good organizer. PW-764, Elec. Ry. Journal, Rialto Bldg., San Francisco.

MASTER mechanic of proven ability, now employed, wishes to make change; 17 years' experience in all departments; Type M and H.L. control; successful in handling labor; A-1 references furnished. PW-774, Elec. Ry. Journ., Real E Trust Bldg., Philadelphia.

There is a

Searchlight Section

in each of the following papers:

[1]
American Machinist

[2]
Chemical and Metallurgical Engineering

[3]
Coal Age

[4]
Electrical World

[5]
Electrical Merchandising

[6]
Electric Railway Journal

[7]
Engineering and Mining Journal

[8]
Engineering News-Record

[9]
Power

[10]
Ingeniería Internacional
(International Engineering—Spanish)

Each of these 10 papers is the leading periodical of the field it serves.

Searchlight advertisements will get you in touch with the important men of these important fields.

COMPLETE POWER PLANT

FOR SALE

1—500 h.p. Westinghouse Compound Engine, Direct Connected to 550 volt Generator.

2—200 h.p. Harrisburg Engines, Belt Connected to Westinghouse Generators.

1—B & W Boiler, 2 Keeler Boilers, Water Heaters, Pumps, Piping, Switchboards and etc.

All in first class operating condition. Immediate delivery. Make us an offer.

The Lewistown & Reedsville Electric Railway Co., Lewistown, Pa.

POWER PLANT EQUIPMENT

FOR IMMEDIATE SALE

Consisting of two 350 hp. 175 r.p.m. Buckeye gas engines direct connected to two 200 kw. 625 volt DC. Compound wound railway generators with switch board, pump and other accessories, all in A. No. 1 operating other accessories, all in A-No.-1 operating

In addition to the above equipment we offer for sale 219 cells of electric storage battery Type F. 13 elements.

Inspection solicited. For further particulars write or wire us. Equipment released account of power purchased.

THE MISSOURI & KANSAS RAILWAY COMPANY
Overland Park, Kans.

NEW
REBUILT

ELECTRIC MOTORS

REWINDING
REPAIRING

NEW A.C. MOTORS ¼ to 15 H.P.—LARGE STOCK USED MOTORS
EXCELLANT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.
EST. 1895 4732-4-6 ST. CLAIR AVE., CLEVELAND, O. *INC. 19*

New Safety Cars

FOR SALE

Eight new single truck, double end, one-man safety motor passenger cars with two motors all fully equipped ready to run. Colors green and buff in enamel (numbered but not lettered).

Shipment Immediately from Car Works

Federal Light & Traction Company
60 Broadway, New York, N. Y.

FOR SALE

16 West. 56 Motors. 4 K-14 Controllers. 4 National type BB-4 Air Brake Equipments complete. 15 Double Truck Cars, 40-ft. long, mounted on Brill Trucks equipped with 4 GE-67 Motors, 2 K-6 Controllers, Air Brakes, etc., complete.

Electric Equipment Co.
Commonwealth Building, Philadelphia, Pa.

BARGAINS!

Garton Daniels 350-750 V. Lightning Arresters.
No. 9 Hemingray Pony Glass Insulators.
Bronze Trolley Frogs.
Flexible Pole Brackets.
Westinghouse Type A Lightning Arrester.
Watt Hour Meters.
110 V., D. C. Bonding Car.
And many other items.

ZELNICKER IN ST. LOUIS

There are many other bargains in our Bulletin No. 285. Send for a copy.

---

700 tons new 9 in.

GIRDER RAIL

Penna Steel Co. section 228, 112 lb. to the yard. Price—$45 per gross ton, f.o.b. cars Brooklyn, N. Y. Subject to R. W. Hunt & Company's inspection.
Prompt shipment.

H. M. FOSTER CO.
Continental Building, Baltimore, Md.

Passenger Cars and Motors

4—All steel PASSENGER CARS, complete, mounted on Baldwin 18C trucks.
4—West. MOTORS, 328 A.

Will be released about Nov. 1.

WESTMORELAND CO. RY. CO.
Derry, Pa.

Immediate Shipment

GIRDER RAIL

300 tons 7 in. girder rail, located Amityville, New York, also 1000 tons 70 lb. rail, 2000 tons 90 lb. rail. Write or wire for prices quoted.

M. K. FRANK, Pittsburgh, Pa.

New—Used—Rebuilt

MACHINERY AND SUPPLIES
for construction and industrial work.

READING ENGINEERING CO., INC.
154 Nassau St., New York

Machinery in Stock for
Immediate Shipment

ROTARY CONVERTERS

1—300 kw., Westg., 3-phase, 60-cycle, 370-v., A.C., 575-v., D.C., 600 r.p.m.
2—200 kw., G.E., 3-phase, 25-cycle, 85-v., A.C., 125-v., D.C., 8 pole, 375 r.p.m.

FREQUENCY CHANGER SETS

1—600 kva., Allis-Chalmers Frequency Changer Set, 300 r.p.m., 3-phase, 60-cycle, 2300-v. one end, 3-phase, 6600-v., 25-cycle on other end.
1—400 kw., G. E., 3-phase, 25-cycle, 6000-v. one side—2400-v., 2-phase, 60-cycle other side—375 r.p.m.

ARCHER & BALDWIN, INC.
114-118 Liberty Street, New York City
Telephone 4337-4338 Rector

Some One Wants to Buy

the equipment or machinery
that you are not now using.

This may be occupying valuable space, collecting dust, rust and hard knocks in your shops and yards.

Sell it *Before* depreciation *Scraps* it.

0178

5—Rotaries—300 K.W.

600 volt D.C., 25 cy. A.C. Trans. 15,000 volt, complete with Switchboards. Good condition. **1600 EACH.**

BARGAINS

Send for our used mach. list.

ROSS POWER EQUIP. CO.
Indianapolis, Ind.

Get your Wants
into the Searchlight

FOR SALE

One Safety Car Motor Equipment, Consisting of

2—Westinghouse No. 506 Motors complete.
2—Circuit Breakers
1—Set Rheostats.
1—Westinghouse Bungalow type Air Compressor.

Transit Equipment Co.
501 Fifth Avenue, New York City

"ELECTRICAL HAND BOOK"

The "Burgess Blue Book" contains drawings and diagrams of Electrical Machinery and Connections —Starting Boxes, Elevators, Controllers, Starters for Printing Press Motors, Street Car Controllers, Transformer Connections, Lighting Circuits.

The section on Calculations takes up Simple Electrical Mathematics, Wiring Tables, Alternating Current Calculations, etc. It also gives 200 formulas, with problems worked out, showing their application.

Price $1.00. If you decide not to keep it, your money will be returned.

BURGESS ENGINEERING CO.
752 East 42nd St., Chicago, Ill.

"Had 5 answers to the first issue"

So the Selma Electric Railway Co., Selma, Ala., wrote us in regard to their recent ad. in the

SEARCHLIGHT SECTION
of
Electric Railway Journal

"SEARCHLIGHT" ads are Opportunity ads. They are watched carefully each week by the whole electric railway field.

"SEARCHLIGHT" ads cost little and invariably bring prompt returns.

For Every Business Want
"Think SEARCHLIGHT First"

0133

NEW

80 lb. RAIL & ACCESSORIES

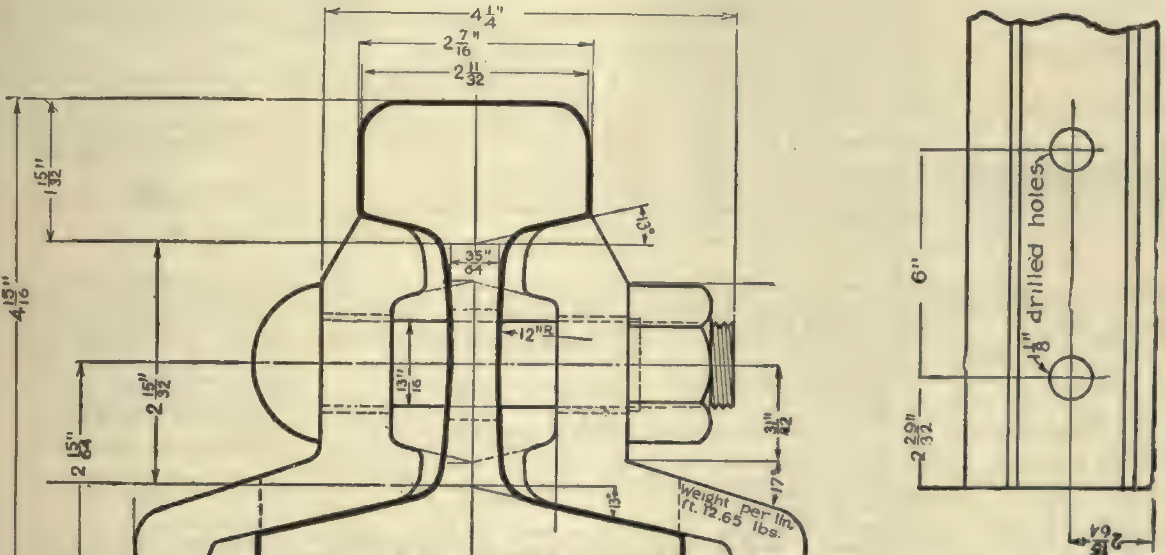
ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

For Sale

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.



Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

NEW AND RELAYING RAILS

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

We buy electric and steam railways that are to be dismantled

St. Louis Office
2115 Railway Exchange Building

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
Green Engineering Company

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Cambria Steel Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
Johns-Manville Co., H. W.

Batteries, Storage
Electric Storage Battery Co.

Bearings, Roller and Ball
Gurney Ball Bearing Co.

Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Johns-Manville Co., H. W.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Brackets and Cross Arms (See also Poles, Ties, Posts; Etc.)
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Bricks, Fire
Green Engineering Co.

Brooms, Track, Steel or Rattan
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
United States Graphite Co.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables (See Wires and Cables)

Carbon Brushes (See Brushes, Carbon)

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Ackley Brake & Supply Corp.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Ceiling, Car (See Headlining)

Circuit Breakers
Automatic Reclosing Circuit Breaker Co.
Cutter Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Independent Lamp & Wire Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Conduits, Underground
Johns-Manville Co., H. W.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Johns-Manville Co., H. W.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co

Converters, Rotary
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
Portable Machinery Co

Conveyors, Coal and Ash
Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Green Eng. Co.
Portable Machinery Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Trac. Brake Co.

Cranes
Niles-Bement-Pond Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co.

Crossing Signals (See Signals, Crossing)

Crossings, Frog and Switch
Wharton, Jr., & Co., Wm.

Crossings, Track (See Track, Special Work)

Culverts
Stark Rolling Mill Co.

Curtains and Curtain Fxtures
Brill Co., The J. G.
Electric Service Supplies Co
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg Co.

Dealers' Machinery
Archer & Baldwin
Electric Equipment Co.
Foster Co., L. B.
Hyman Michaels Co.

Derailing Devices (See also Track Work)
Cleveland Frog & Crossing Co.
Wharton, Jr., & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc.

Draft Rigging (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Niles-Bement-Pond Co.
Ohio Brass Co.

Drinking Cups, Sanitary Paper
Individual Drinking Cup Co., Inc.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc., Walter A.

Electrical Wires and Cables
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co. The
Byllesby Co., Inc., H. M.
Engel & Hevenor
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jacobs & Co., J. L.
Jackson, Walter
Jurney, Oscar C.
Kelly-Cooke & Co.
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Scofield Engineering Co.
Stone & Webster
White Engineering Corp., The J. G.

Engines, Gas, Oil or Steam
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co

Work this paper overtime

LIKE every other McGraw-Hill technical journal, this paper of yours is edited from a broad viewpoint.

Which means that many articles of only collateral interest to you have direct application to the problems of other chaps in your organization.

So route it around when you have drained it dry.

THE 11 McGRAW-HILL PUBLICATIONS

McGraw-Hill Co., Inc., New York

Power
Coal Age
Electrical World
American Machinist
Journal of Electricity
Electrical Merchandising
Electric Railway Journal
Engineering News-Record
Ingenieria Internacional
Chemical & Metallurgical Engineering
Engineering & Mining Journal

F-3

for Precision in Test Work

Weston

Model 155

Portable Alternating Current Instruments

are standard for general testing because of their compactness, light weight and accuracy.

These Instruments operate on the electromagnetic principle which has been applied in so ingenious a manner that these Instruments possess many of the characteristics of direct current, permanent magnet instruments.

The scales have comparatively large divisions, permitting accurate readings to be obtained. The pointers are knife edged and travel over mirror slot scales.

The cases are dustproof and very handsome but durable.

These Instruments are made as Ammeters, Milliammeters and Voltmeters. The Voltmeters may be had in one, two and three-range combinations.

For further information see Bulletin 2005, sent upon request.

Weston Electrical Instrument Co.

21 Weston Ave.,
Newark, N. J.

Branches in All Principal Cities.

Model 155
Portable
A.C. Voltmeter.

B. A. Hegeman, Jr., President; Charles C. Castle, First Vice-President; Harold A. Hegeman, Vice-President and Treasurer; Fred C. J. Dell, Secretary; W. C. Lincoln, Manager Sales and Engineering.

National Railway Appliance Co.

50 East 42nd St., NEW YORK CITY

Hegeman-Castle Corporation, McCormick Bldg., Chicago, Ill.
National Railway Appliance Co., Munsey Bldg., Washington, D. C.
National Railway Appliance Co., Little Bldg., Boston, Mass.

RAILWAY SUPPLIES

Tool Steel Gears and Pinions, Anderson Slack Adjusters, Genesco Paint Oils, Clapp's Fire Resisting Paint, Dunham Hopper Door Device, Feasible Drop Brake Staffs, Anglo-American Varnishes, Paints, Enamels, Surfaces, Shop Cleaner, Johnson Fare Boxes, Drew Line Material and Railway Specialties, Perry Side Bearings, Miller Trolley Shoes, Hartman Centering Center Plates, Economy Power Saving Meters, H. and W. Electric Heaters, Garland Ventilators, Pitt Sanders, National Safety Car Equipment Co.'s One-Man Safety Cars, Flaxlinum Insulation.

McGuire-Cummings Mfg. Company

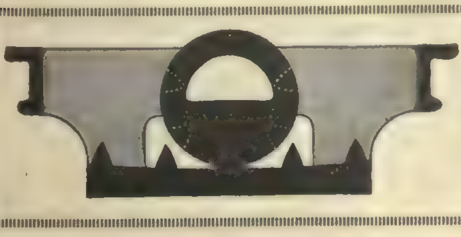
General Offices—111 West Monroe St., CHICAGO

City and Interurban Cars and Trucks, Snow Sweepers and Plows

Express, Combination and Work Cars, Electric Locomotives

DAVIS STEEL WHEELS
Standard for Electric Railway Service

AMERICAN STEEL FOUNDRIES
1100 McCormick Building Chicago



STUCKI SIDE BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

MORE-JONES "TIGER-BRONZE" AXLE AND ARMATURE BEARINGS

Not always the cheapest, but ever lowest in ultimate cost

MORE-JONES BRASS & METAL CO.
St. Louis, Missouri.

WHAT AND WHERE TO BUY

Fare Boxes
Brill Co., The J. G.
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.

Fibre and Fibre Tubing
Continental Fibre Co.
Johns-Manville Co., H. W.
Westinghouse Elec. & Mfg. Co.

Field Coils (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
Castle Inc., James M.
Johns-Manville Co., H. W.

Floodlights
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.

Flooring, Grating
Irving Iron Works

Forgings
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track (See Track Work)

Funnel Castings
Wharton, Jr., & Co., Inc., Wm.

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville Co., H. W.
Multiple Elec. Products Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
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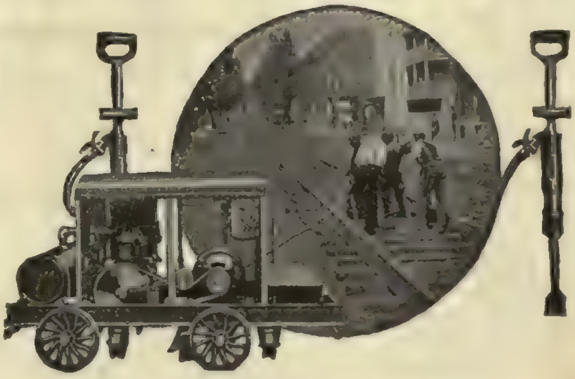

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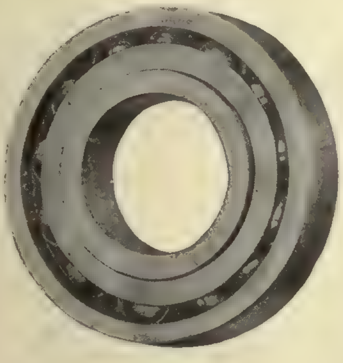

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Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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McGraw
Electric Railway Directory

August 1920 Edition

A gold mine of valuable information to manufacturers and sales managers whose markets touch the Electric Railway field.

Corrected to July 1920

Comprises 280 pages of authoritative and complete data on more than 900 electric railways in the United States, Canada and Mexico.

As a reference book

the McGraw Electric Railway Directory is virtually an encyclopedia of this branch of the electrical industry.

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for sales promotion work it is unequalled in completeness and accuracy. The sample report in the next column suggests the multitude of ways this directory will serve you.

Sample Report

427—Massachusetts Northeastern St. Ry. Co.—Office, 50 Merrimack St., Haverhill (Controlled by the New Hampshire Elec. Rys.) (Formed by merger of the following street railway cos.: Amesbury & Hampton St. Ry. Co., Citizens' Elec. St. Ry. Co., Haverhill & Amesbury St. Ry. Co., Haverhill & Plaistow St. Ry. Co., Haverhill & Southern New Hampshire St. Ry. Co., Lawrence & Methuen St. Ry. Co. and the Lowell & Pelham St. Ry. Co., in Massachusetts, Haverhill, Plaistow & Newton St. Ry. Co., Hudson, Pelham & Salem St. Ry. Co., and Seabrook and Hampton Beach St. Ry. Co. in New Hampshire.) (Operates in and connects Amesbury, Dracut, Haverhill, Lawrence, Lowell, Merimac, Methuen, Newbury, Newburyport, Parker River (Old Town), Plum Island, Salisbury and Salisbury Beach, Mass., and Hampton Beach, Hudson, Hudson Centre, Nashua, Newton, Pelham, Plaistow, Salem, Seabrook and Seabrook Beach, N. H.)

Pres. David A. Belden.......... Haverhill
V.-Pres. & Gen. Mgr.
Ralph D. Hood................ "
V.-Pres. & Treas. Fred'k E. Webster "
Supts. { Western Div.
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Eastern Div.
George H. Leighton, Amesbury
Supt. Lines & Bonding
W. S. Mellon................ "
Cashier & Paymaster
Guy H. La Suer............ "
Pur. Agt. Clifton L. Bartlett.... "
Clain Agt. Harry B. Whitehouse "
Gen Pass. Agt. George R. French "
Elec. & Signal Engr. W. S. Mellon "
M. M., Harry A. Osgood, Salem Depot, N. H. Energy from Rockingham County Lt. & Pwr. Co., Portsmouth, N. H; trans. volt. 13,200 v: trolley volt. 600 v.
7 sub-stats. tot. cap. 4450 kw.
Repair shops at Salem Depot, N. H.
Reaches Canobie Lake and Hampton, Salisbury and Plum Island Beaches.
127.598 miles; 4-8½ gage. 140 mo. pass., 3fgt. mo. and 17 other cars; 17 plows.
*50

428—New Hampshire Electric Railways Office, 50 Merrimack St. (Holds secerities of and controls Massachusetts Northeastern St. Ry. Co., Dover Somersworth & Rochester.

It Gives at a Glance

in each report

Name of company and address.

Executives, ***Purchasing Agents*** and Managing Personnel with business address.

Financial data, receiverships, affiliations, cost of plant, bonds, etc.

Power house equipment; ***boilers and turbines,*** make and capacity; ***generators,*** make and capacity, etc.

Power stations, repair shops; location.

Communities served; names of them.

Amusement Parks, ownership and location.

Mileage, by single track, gage.

Rolling stock equipment; itemized.

Railway and officials properly indexed.

And other data.

This edition is limited. Order now for your office and salesmen or write for further information. Issued semi-annually, $7.50 per year. Single copy $4.00.

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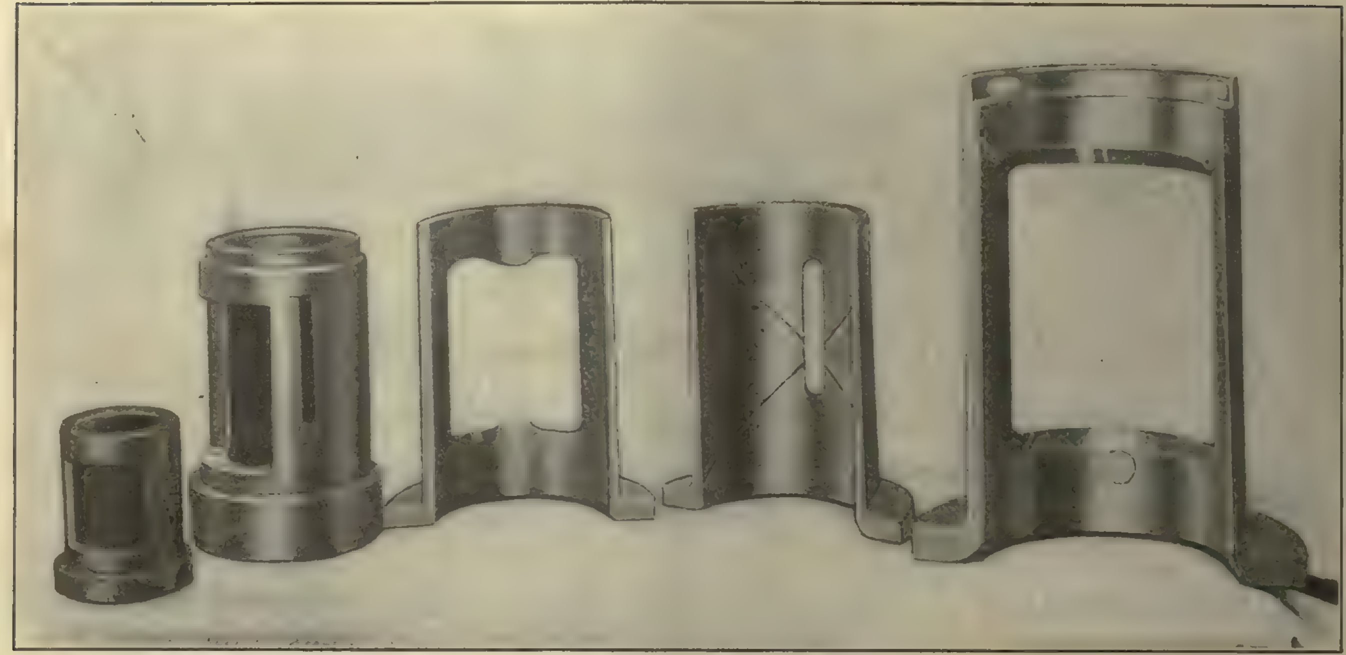
COLUMBIA



Railway Motor Bearings

that save pinions, oil, shafts and axles

Columbia axle bearings are made in absolutely perfect halves.

The armature bearings have a press fit, plus keys or dowels to prevent turning.

Oil grooves are cut to help the oil to enter and more evenly distribute itself throughout the bearing.

The edges at the split of axle bearings are beveled to prevent the wiping away of the oil film by sharp edges.

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Columbia bearings will be machined to give the clearance you have found most desirable for your service.

Columbia makes all sizes from the largest to the smallest.

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F. F. BODLER, 903 Monadnock Bldg., San Francisco, Calif.
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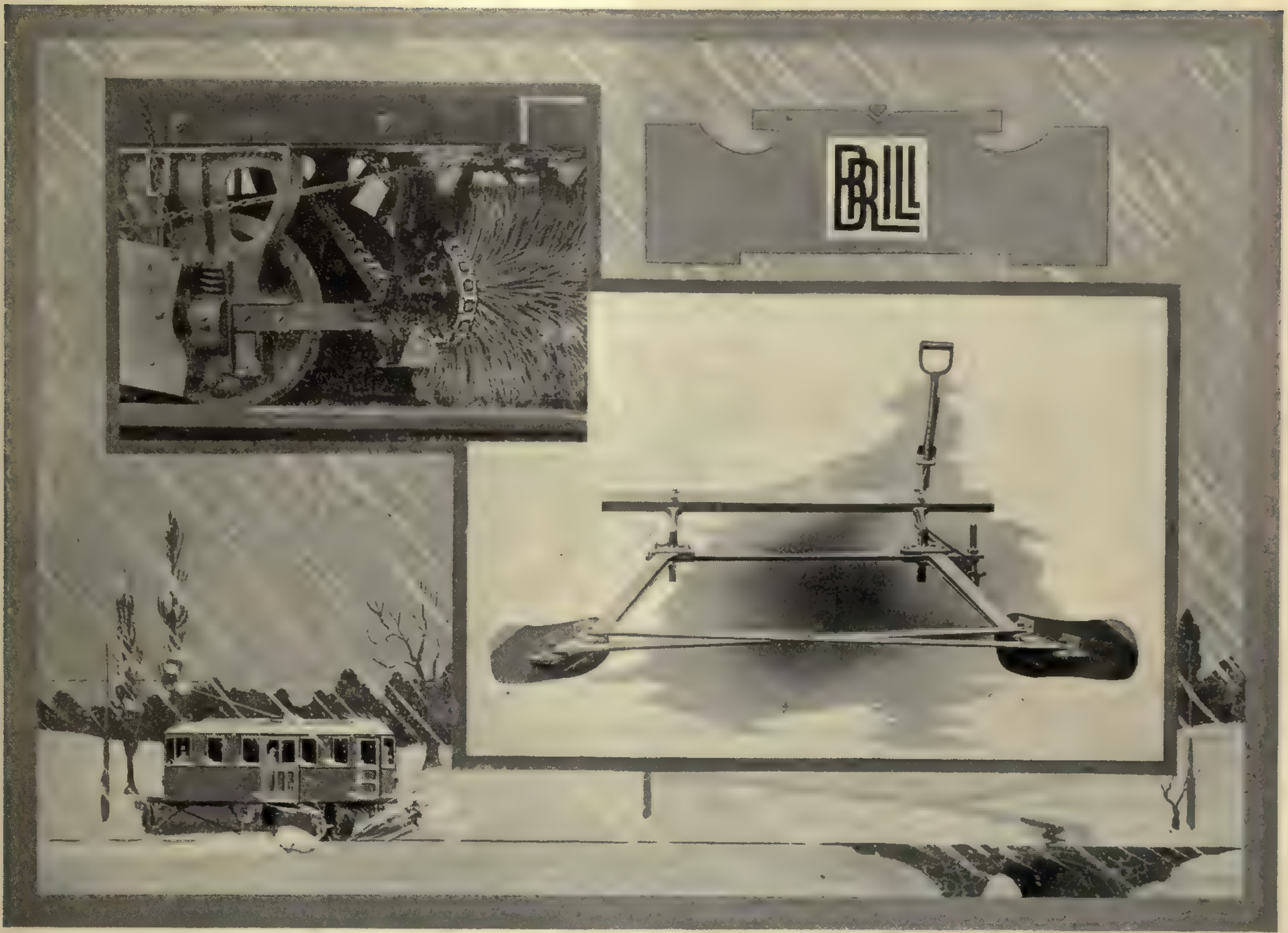
- Armature and axle straighteners
- Armature shaft straighteners
- Armature buggies and stands
- Babbitting molds
- Banding and heading machines
- Car hoists
- Car replacers
- Coil taping machines for armature leads
- Coil winding machines
- Pinion pullers
- Pit jacks
- Signal or target switches
- Tension stands

CAR EQUIPMENT

- Armature and axle bearings
- Armature and field coils
- Bearings (axle and armature)
- Brush-holders and brush-holder springs
- Brake, door and other handles
- Brake forgings, rigging, etc.
- Car trimmings
- Commutators
- Controller handles
- Forgings of all kinds
- Gear cases (steel or malleable iron)
- Grid resisters
- Third-rail shoe beams and accessories
- Trolley poles (steel) and wheels



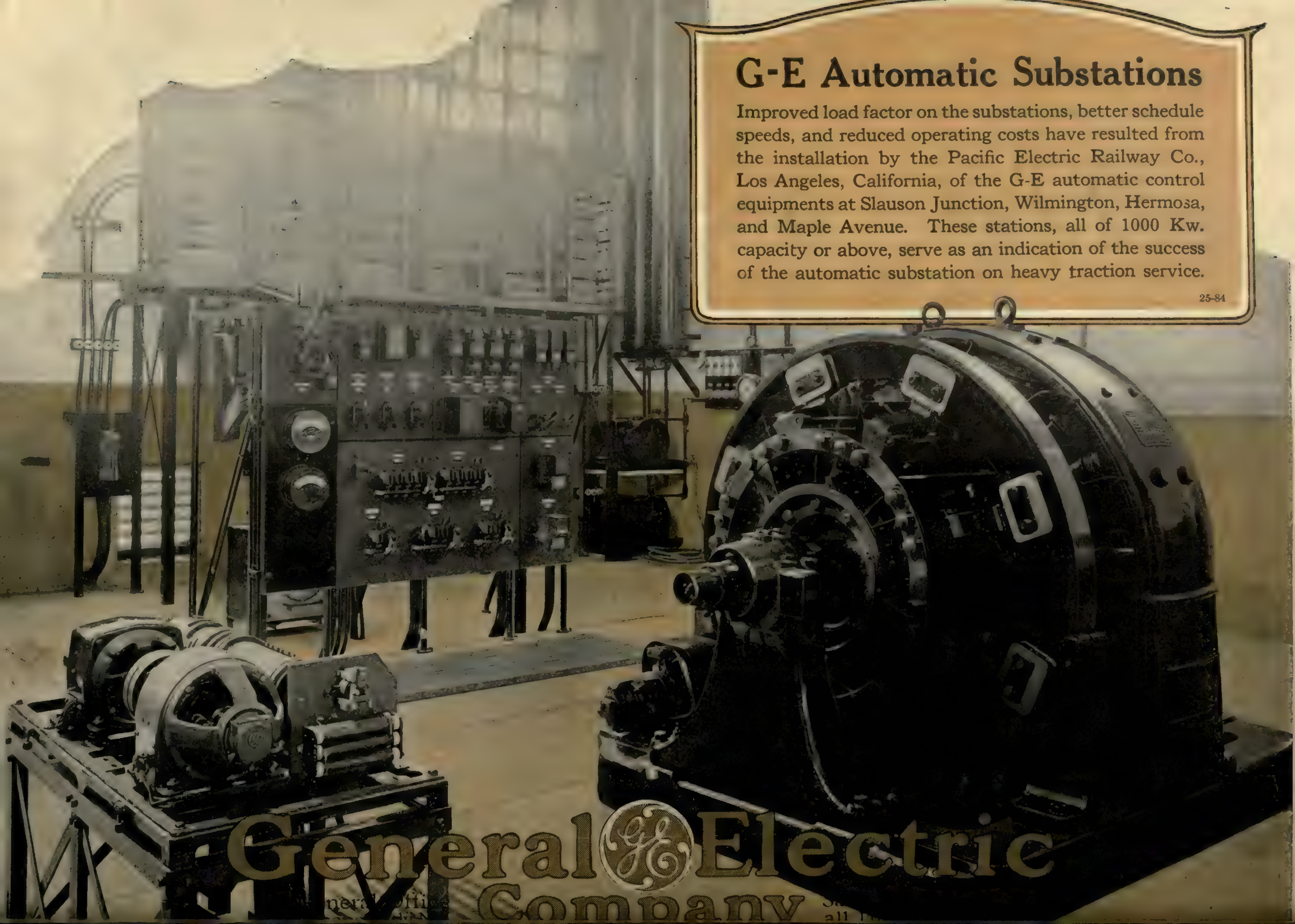
For the Winter's Snow

You may need new sprocket chains for your snow sweepers, or some other equally important part of your snow fighting equipment. It will pay you to order now before the winter's snow comes.

Brill sprocket chains have malleable rollers and drop-forged links. They are strongly put together, and will last.

The cars equipped with Brill Track Scrapers illustrated will maintain their schedules during light snows without assistance from the sweepers; consequently, they save money by removing the necessity for sweeper operation.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. — G.C. KUHLMAN CAR CO — WASON MANF'G CO.
ST. LOUIS MO. CLEVELAND, OHIO SPRINGFIELD, MASS.



G-E Automatic Substations

Improved load factor on the substations, better schedule speeds, and reduced operating costs have resulted from the installation by the Pacific Electric Railway Co., Los Angeles, California, of the G-E automatic control equipments at Slauson Junction, Wilmington, Hermosa, and Maple Avenue. These stations, all of 1000 Kw. capacity or above, serve as an indication of the success of the automatic substation on heavy traction service.

25-84

General Electric Company

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ELECTRIC RAILWAY JOURNAL

$11.08 per Foot

"The 8500-foot piece of Steel Twin Tie Track which we completed in September will cost us $11.08 per foot of single track, including the removal of the old track and supervision and I have been complimented on the job by our New York people.".

Engineer of Way of a 60 Mile Western Property

Favor us with a request for complete details of the type of construction used and the name of the railway.

The International Steel Tie Company
CLEVELAND

Northern Ohio Traction Hauls Freight Extensively

There are similar opportunities for freight development on other railways with the adoption of adequate facilities and the selection of proper and reliable equipment.

This progressive road operates regular scheduled freight train service between Canton, Akron, Detroit, Toledo, Cleveland, Ravenna, Niles and Youngstown in conjunction with adjoining railway lines.

The most recent addition to their freight equipment consists of four 38-ton baggage type motor cars equipped with quadruple Westinghouse 338-V motors and HL control.

Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

Westinghouse

Vol. 56, No. 18 New York, October 30, 1920 *Pages 905-952*

Electric Railway Journal

HENRY W. BLAKE and HAROLD V. BOZELL, Editors HENRY H. NORRIS, Managing Editor

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Circulation of this issue, 6,375

Advertising Indexes—Alphabetical, 48; Classified, 42, 44, 46; Searchlight Section, 40-41

Two of the new 250 Safety Cars recently purchased by the Eastern Massachusetts (Bay State) Street Ry., all of which carry "Bungalow" air compressors.

"Bungalow" Type Air Compressor

250 "Bungalow" air compressors selected by Largest Electric Railway Line

All the largest orders for Safety Cars include the "Bungalow" air compressor —Brooklyn, 200; Eastern Massachusetts, 250; Public Service Corpoation of New Jersey, 200. The highly satisfactory service rendered by this dependable machine resulted in its selection.

Its light weight, low build, compact and rugged form—and above all, its absolute dependability, recommends the "Bungalow" to exacting electric railway service.

Not only the large systems select the "Bungalow," but many smaller ones as well. The "Bungalow" is installed on 3306 Safety Cars operating on 185 different electric railways in the United States.

Brake Building Our Business for a Lifetime

Westinghouse Traction Brake Company

General Offices: Pittsburgh, Pa.
Works: Wilmerding, Pa.

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San Francisco

Washington

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St. Louis

Says a Big British Manager on Safety Cars:

"They certainly appear to meet all the requirements of normal traffic"

Mr. C. J. Spencer, general manager Metropolitan Electric Tramways, Limited, London, England, in his paper, entitled, "Some Notes on Transportation in America," describing his impressions of what he saw early in 1920 of American Practices, said at the Twelfth Annual Congress of the British Tramways & Light Railway Association on July 2, 1920:

"I found . . . in the States that some car-building firms have designed most ingenious cars carrying from 30 to 40 passengers, and are supplying them in large quantities not only for small, light-traffic systems but even for fairly heavy routes."

"These cars . . . are quickly accelerated from rest to full speed, and as quickly brought to a stand by means of the air brake."

"The cost of operation is about half that of an ordinary heavy car."

"In the States, the one-man car is universally popular—popular with the management, with the public, and, I was pleased to find,

Also Popular with the Men Who Operate Them"

Mr. Spencer is referring to just one kind of car—the genuine safety car which IS A SAFETY CAR ONLY.

When equipped with automatic laborless apparatus, so interlocked that, regardless of the illness or distraction of the operator, the power will be cut off instantaneously, the air brakes and sander apply immediately thereafter and the doors unlatch for safe and easy exit. Furthermore, it is a Safety Car only when the doors must be closed and the step folded before the car can start, and when the airbrake must be applied before the doors are opened and the step lowered in bringing the car to a service stop.

SAFETY CAR DEVICES COMPANY

Main Office—Boatmen's Bank Bldg., ST. LOUIS, MO.

CHICAGO	WASHINGTON, D. C.	NEW YORK	SAN FRANCISCO	PITTSBURGH
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CANADA—Canadian Westinghouse Co., Ltd., Hamilton, Ont.

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Tacoma's Standard

About six years ago the Tacoma Railway and Power Company began to put up No. 00 Phono-Electric Trolley Wire on Downtown Curves.

With the result that it was made the standard wherever service (on tangent, curve or cross-over) was severe.

Thus Tacoma has put itself in the class of the companies that have reduced their overhead line troubles to the minimum because "overhead" is not a frequent source of trouble where Phono-Electric is used.

Bridgeport Brass Company
Bridgeport Connecticut

Like so many of its mates, this Safety Car has a Crouse-Hinds Imperial Headlight

The Safety Car Has Made Good

No longer is the Safety Car a novelty. It is thoroughly established as a money-saving, money-making tool of the electric railway industry.

Railway men were as quick to stick to their proved equipment devices as they were to recognize the merits of the new idea in cars.

So large numbers of Imperial Headlights, O-B Catchers, Bases, Sanders, are helping Safety Cars make good.

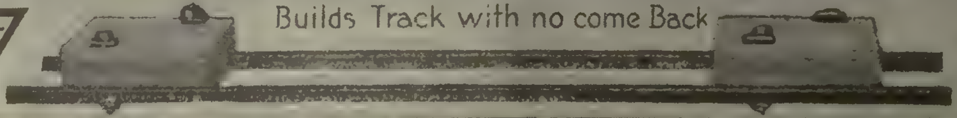
The Ohio Brass Company, Mansfield, Ohio

New York Philadelphia Pittsburgh Chicago
San Francisco Los Angeles Paris, France

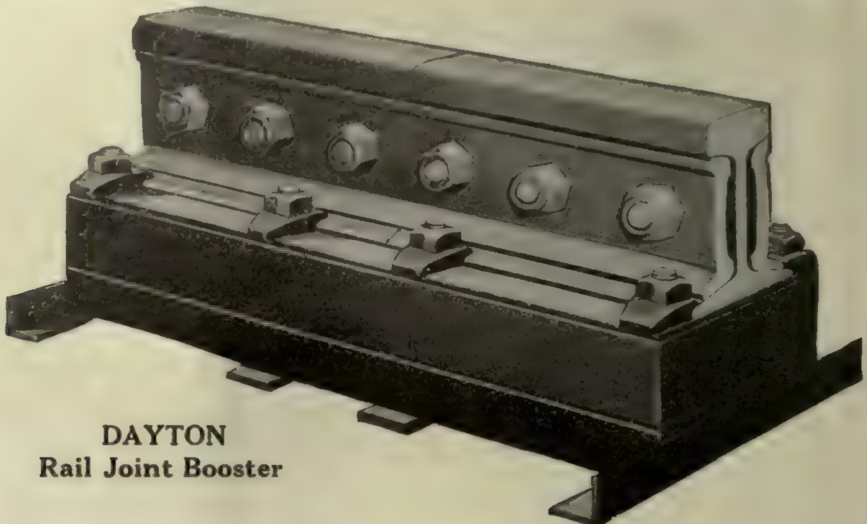
Manufactures: Trolley Materials, Rail Bonds, High Tension Porcelain Insulators,
Third Rail Insulators, Car Equipment Materials

Exclusive Sales Agents in the U. S. for Crouse-Hinds Imperial Headlights.

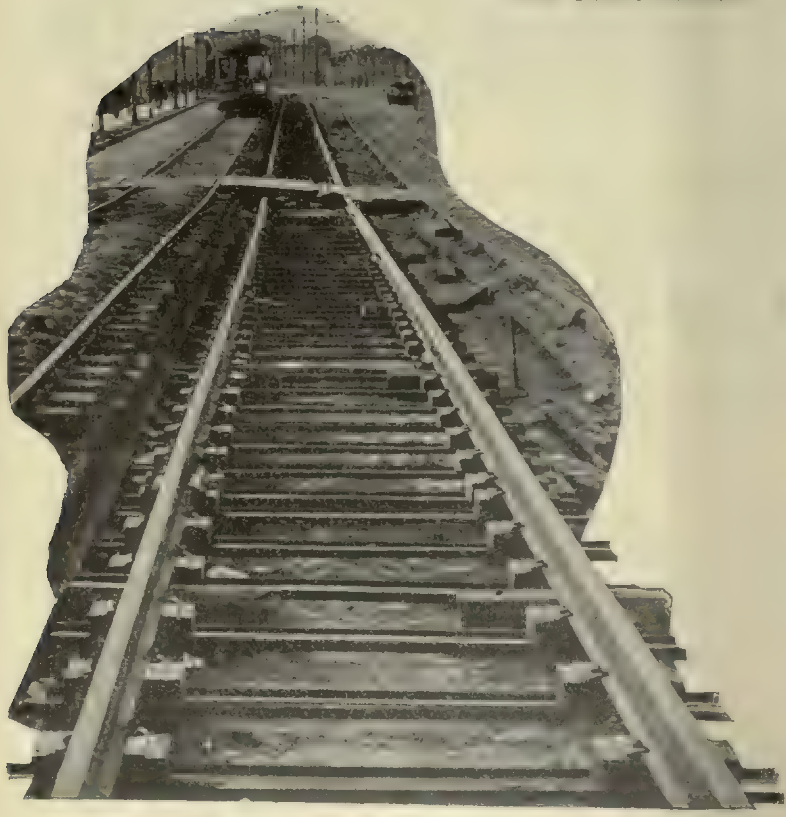
The RESILIENT RAILWAY TIE



Builds Track with no come Back



DAYTON
Rail Joint Booster



As the rubber heel acts as a buffer for the human body, so the asphalt cushion in the Resilient Railway Tie acts as a buffer for your track foundation, and your rolling stock. It absorbs the hammer blows, which unless dissipated destroys your track foundation, causes the paving to loosen and break, plays havoc with the rolling stock and shatters your patrons nerves. This shock absorber is found in the Resilient Railway Ties and Joint Boosters. A trial of the "Joint Booster" now on old track will convince you, what a new track with Resiliency applied throughout will be.

—the secret is Resiliency!

THE DAYTON MECHANICAL TIE CO., 704 COMMERCIAL BUILDING, DAYTON, OHIO

These Keystone Specialties are Standard Equipment on nearly all Safety Cars.

Golden Glow Headlights

Keystone Rotary Gongs

Keystone Air Sanders

Keystone Trolley Catchers

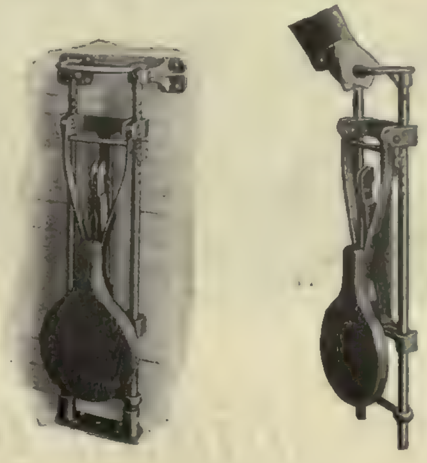
Faraday Car Signal Systems

Keystone Steel Gear Cases

Keystone-Hunter Destination Signs

Always specify them for they will serve you well. Write for Bulletin No. 167, showing many other Keystone specialties for use on safety cars.

KEYSTONE MOTORMEN'S SEATS



Keystone motormen's seats may be instantly collapsed by simply giving the under supporting rod a kick with the foot. They are adjustable in height and are entirely out of the way when not in use.

Keystone motormen's seats, when in use, are so placed as to be in the proper relative position for operation of the controller and brake valve, and arranged so that the motorman may readily operate the foot gong or a foot valve from his sitting position. They may be collapsed without even distracting the motorman's attention from his work and they are quickly adjustable in distance from the floor for men of various heights. They are sufficiently strong for the most severe service, being made entirely of malleable iron and steel parts, with the seat proper of wood. When folded they occupy no valuable space.

Brackets and floor plates at both ends of a car make this type of Keystone seat removable for use on either platform.

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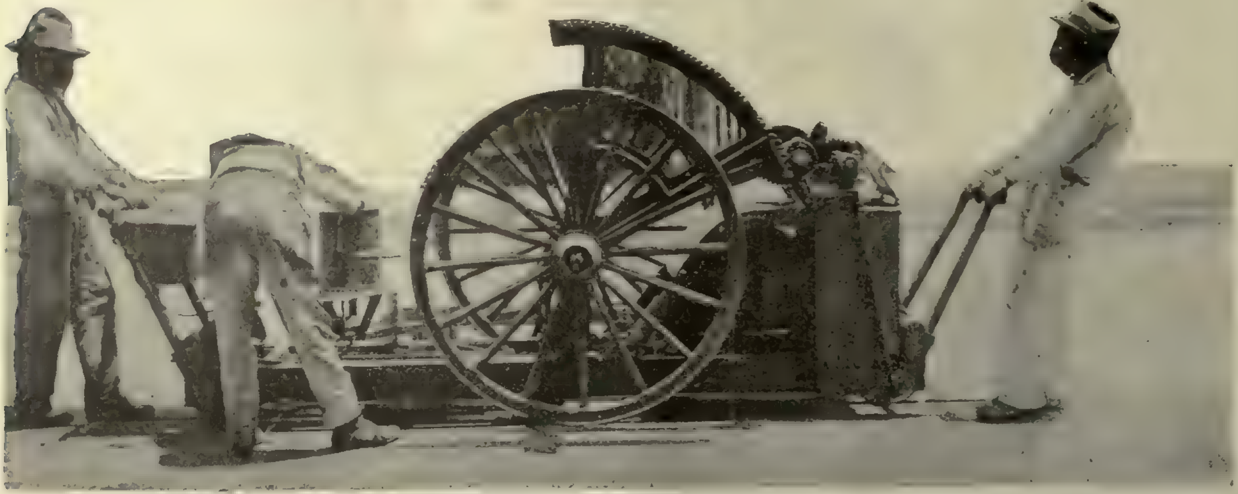

Fifteen Reasons Why

The Reciprocating Track Grinder

is in general use on the largest electric railways in this country and abroad

1. Entirely satisfactory for grinding joints, corrugations, or special work.
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4. Simple design, ruggedly built.
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14. Results in a smooth easy-riding track surface.
15. Saves cost in short period of time.

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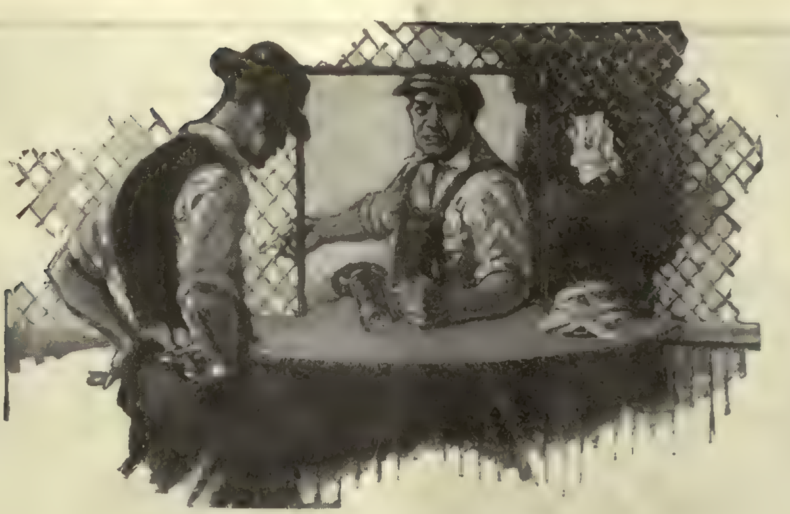


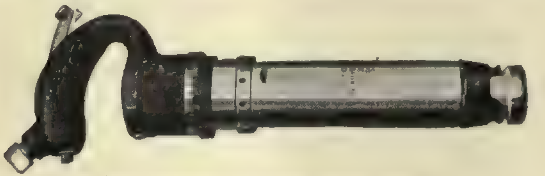
"It won't put 'em down—gimme a Boyer!"

TOOLROOM men know that this doesn't happen with the Boyer-equipped workman. The biggest argument in favor of Boyer Riveting Hammers is that they are the chosen favorite of veteran riveters the world over.

Workmen *do* more and *earn* more with a Boyer—both employer and employee benefit—due to its well-balanced, smooth operation, its rapid, powerful blows, its long-wearing parts, and faithful dependability.

Boyers have ***durable*** valves, procurable in four over-sizes—giving Boyer valve cases *five lives.*

Standardize on Boyers. Prompt delivery is assured by stocks of complete hammers and renewal parts carried at all Branches. Ask for Bulletin 600.



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Johannesburg
Lisbon
*London
Madrid
Milan
*Montreal
Osaka
Paris
Seoul
Tokyo
Toronto
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BOYER PNEUMATIC HAMMERS · LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS
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CHICAGO PNEUMATIC

BOYER HAMMERS

The world's standard wherever rivets are driven

ANACONDA COPPER WIRE

Conductivity

The conductivity of copper wire is becoming a more and more important consideration in Electric Railway overhead construction.

The B & M Electrolytic copper wire bars from which Anaconda Wire is made have an average conductivity of 100.75% Mathiessen's Standard and contain less than 1/100 of 1% metallic impurities.

Specify and use "Anaconda."
It pays.

"From Ore to Finished Product"

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Rolling Mills Department
Mills—Great Falls, Montana
General Office: 111 W. Washington St.
Chicago

How Cleveland gets 10.82 M.P.H. schedule speed

Standardize *Pneumatize*

The Cleveland Railway averaged in 1919 a platform expense of 11.9 cents per car-mile.

It would have been a lot more if the company hadn't succeeded in getting up to the splendid schedule speed of 11.82 miles an hour (exclusive of layovers).

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CHAPTER TWENTY-FIVE

THE ALL-*BUT* PERFECT STATE

—Everything will be on Double Shift

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And that is why we say that the Dynamotor will have its place on all the roads there because the one Dynamotor in most instances is used for either bonding or welding the rail—for trackwork welding or for shopwork welding.

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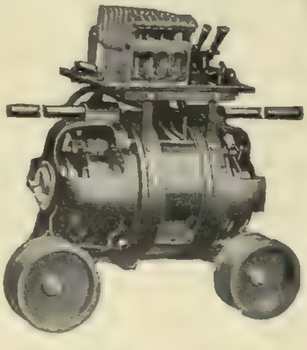

READING NUMBER TWENTY-FIVE

Q. How can one part do the work of two, if it has but one service—take the gear case for instance?

A. In that case if it can't perform two services, make it have double life—and the Dynamotor will help by rejuvenating dead cases.

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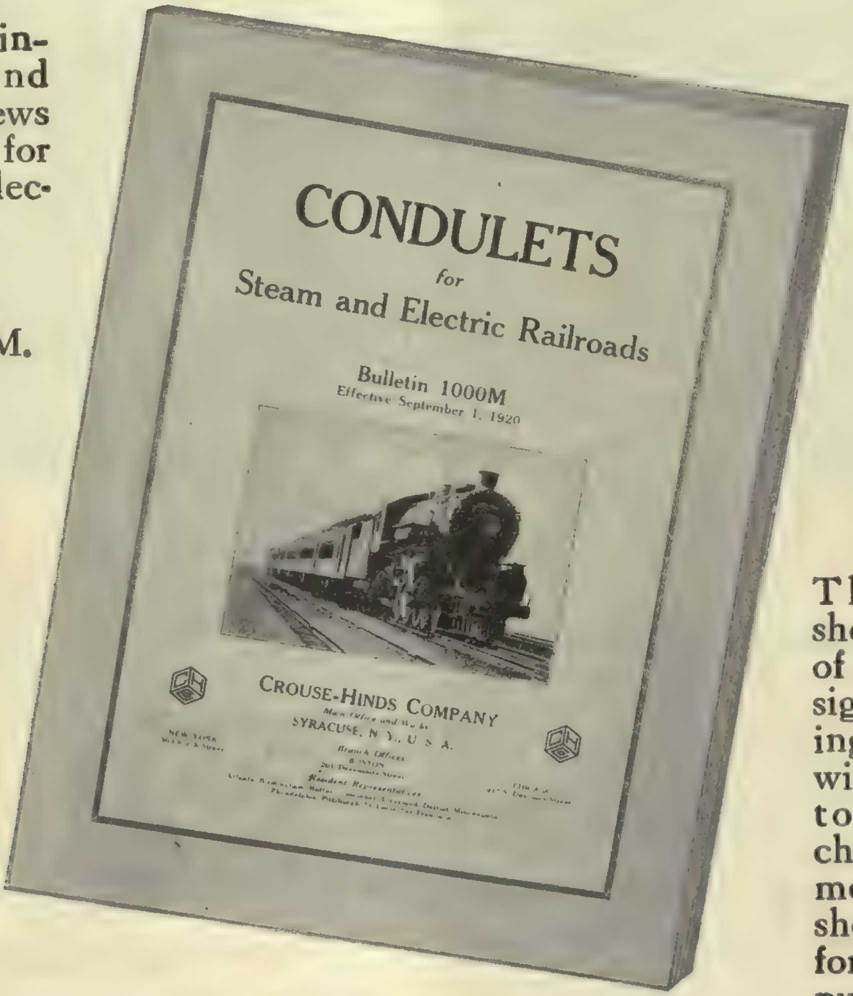

CONDULETS
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Bulletin 1000M
Effective September 1, 1920

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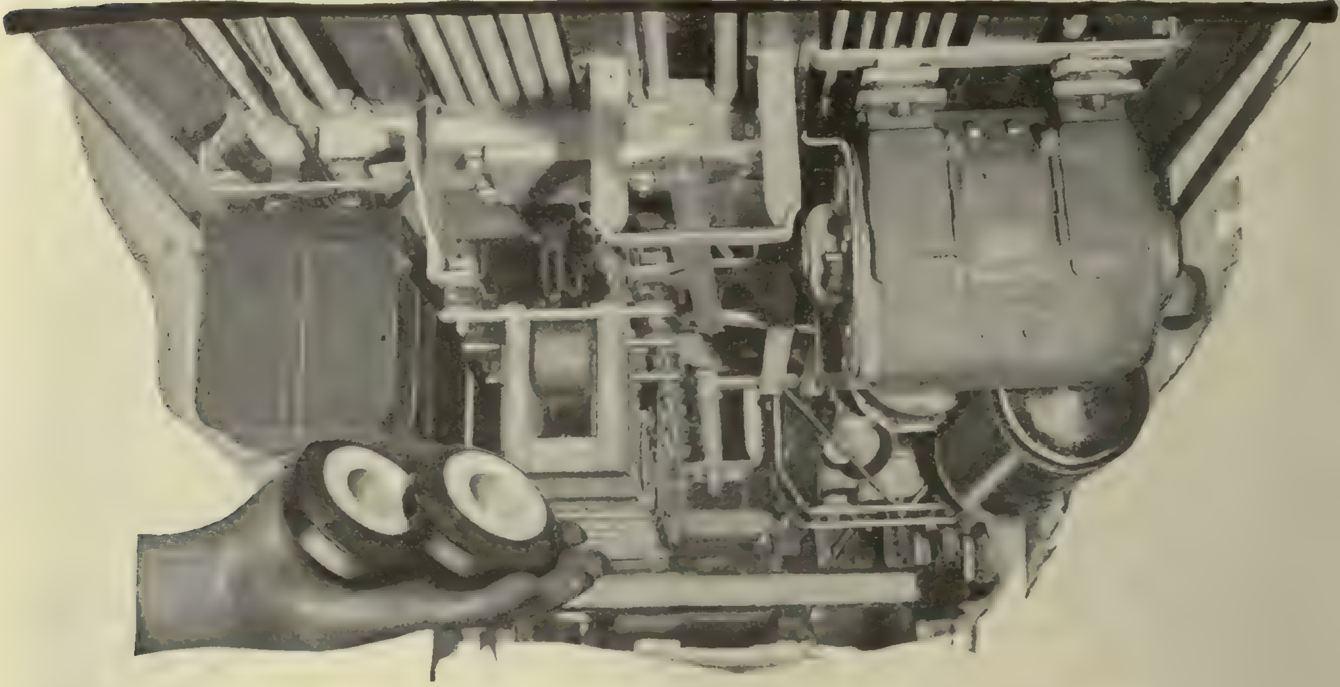

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Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review

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Volume 56 New York, Saturday, October 30, 1920 *Number* 18

Fitting Interurban Schedules to Traffic

ONE of the greatest opportunities for reducing operating expenses on city properties has been repeatedly found to be in a revision of schedules and rerouting to make the service conform to the traffic available. We wonder if this same trend of study might not well be applied to the interurban railways. In the early days the idea of running a car every hour—frequent service—was thought to be the characteristic of the electric line that formed the principal attraction for patronage. This tradition still prevails, and there is no doubt that it is a convenience to travelers well worth preserving provided there is enough traffic every hour to make the trip profitable. But the cost per car-hour is so high nowadays that it is more important than ever that the interurban manager should check up his schedules with a view to cutting any unprofitable car mileage. It is our observation that a good many unprofitable trips are being run on a good many interurban lines. We know of one case where a study of the service requirements and an adjustment of the schedule thereto resulted in increasing the revenue 20 cents a car-mile without any apparent loss of business. Another company has been gradually remolding its schedule to fit the traffic, with a favorable result on car earnings and no apparent loss of business. In other words, if the traffic available at a certain hour of the day is not enough to justify the expense of running that car it shall be taken off or the interval between cars spaced out until the patronage is adequate. The interurbans are well established now and we believe they can advantageously adhere to paying schedules even though it may mean paying less attention to the position of the hands of the clock in setting the leaving time.

"Trusteeship" and the Company Section

THE company sections of the American Electric Railway Association are organizations whose possibilities, it appears to many observers, have not been fully realized or at least have not been fully capitalized by those railways which are fortunate enough to have company sections on their properties. A company section provides the best possible medium for the circulation within the organization of information regarding the electric railway situation in general and of the local company in particular. It is also a most active force for the development of a sense of responsibility and obligation among the section members who are the rank and file of the industry today and the leaders of the industry of tomorrow.

In a recent address one of our leading public utility commissioners dwelt on the subject of "trusteeship," which, he said, rests upon every electric railway man today. He emphasized the absolute necessity of the electric railway to the community and at the same time referred to the inertia and lack of knowledge evidenced by the public in trying to settle what is now recognized as the electric railway problem. He then said that meanwhile, until the American public has shown itself capable of finding the solution, the electric railway operating personnel are and must be the trustees for the public in keeping in operation these most necessary railways. That it is a trust of no mean magnitude is evident to all who are in a position to have all the facts, and the more closely one examines the situation the more evident this truth becomes. Some one must realize both the duty and the opportunity, and the electric railway men are the ones to do it.

How to get all railway men to sense this situation is not so easily answered, but the commissioner, seconded by others present, suggested that the company section, composed of men of all ranks on any given property, is the place to develop the idea. Is this an opportunity in company section work? It isn't something which can be treated as part of an evening's program, but it is a purpose which every company section can well strive to attain as part of its regular work.

The Best Way to Dispose of Claims Is Not to Have Them

DURING the last few years the proper function of medical science has come to include the prevention of disease as of even greater importance than its cure. The latter will still remain, of course, part of the duty of the physician, but if he can reduce the causes of particular kinds of illness a great step in advance in the welfare of mankind will be made.

Much the same situation exists in the claims departments of our various railways. A decade or so ago, for example, the annual conventions of the Claims Association were devoted largely to discussions of such topics as the best means of securing the names of witnesses of accidents, the approved methods of preparing cases for trial, the practical value of expert medical testimony, whether medical examinations should be obtained in all accident cases, whether the best method of settling claims is by cash or check, what statistics of accidents should be kept, and whether so-called permanently injured persons should be kept under observation after their claims have been paid.

Problems of this kind remain, of course, to engage the attention of the claims department because accidents still occur, in spite of all that can be done, just as physicians will still have to study how to cure patients of disease. But the great part of the work of the claims department in the modern railway is now the prevention of accidents, and of the four technical sessions at the 1920 convention three were devoted entirely to this side of the work. It is obvious that this is a most desirable plan, from both a humanitarian and a financial point of view. It is logical also that the claims department should be the one to lead in this work, because it is the one which comes closest to the unfortunate results of accidents.

The Automobile Hazard and How It May Be Abated

THE widespread use of the automobile has involved many problems of an economic and social relation to the business world as well as to the electric railway, but none perhaps is more serious than that of the personal hazard to which the heedless operation of automobiles subjects every other user of the streets. Formerly, when the electric car was the most rapidly moving vehicle on the highway, though running on a fixed track and at a maximum speed of perhaps half of that of the average automobile of today, this speed was carefully regulated by the authorities in the interests of safety. Now, many of these restrictions remain, although the electric car in many cases is practically the slowest moving vehicle on the street. At the same time, powerful gasoline locomotives, for that is practically what they are, not bound by any track and in charge of inexperienced drivers, are allowed to run amuck.

The Claims Association did well to give up a day to the discussion of this subject and means by which this danger can be abated. In the papers presented at that session some very striking statements were made, including the one that automobiles are now causing half as many deaths in this country as industrial accidents and more than railroads and mines combined. The automobile evil is one also which is not confined to any one section of the country, but seems to be equally felt in all. It does not, of course, concern electric railway companies only. It affects all citizens alike, and it came up for discussion at the electric railway convention only because electric railway men have expert knowledge of transportation conditions and are trained to the use of traffic statistics and thus have probably a quicker perception of a situation of this kind than the ordinary citizen.

Various suggestions were made in the Claims meeting in regard to remedial measures. Where there is an evil there is usually a remedy, and the situation in regard to automobile hazards was not regarded by the claim agents as entirely hopeless. Means by which the highway can be made more safe were clearly pointed out at the meetings—nothing very radical, only the application of common sense to an admittedly serious situation. Now that the electric railway men have shown the way the reforms should be made effectual by the general body politic.

Motion Pictures at the Convention

DELEGATES to the Engineering and Transportation & Traffic association meetings at Atlantic City had an opportunity to see motion pictures turned to the use of the electric railways. The engineers, in a space of thirty minutes, saw practically the full process of track construction in Cleveland, something they could not see completely otherwise without spending perhaps several weeks in Cleveland at a particular time when track construction was under way. The Cleveland Railway has had so many inquiries about its advanced methods of building new track and tearing up old that it was decided to have this picture taken in order to be able more intelligently to tell other maintenance engineers about these methods. The film is thus a contribution to the advancement of the art, for, seeing it, other engineers will gain new ideas out of which may come not only the use of more modern methods on their own properties but perhaps an improvement on C. H. Clark's Cleveland ideas and machines.

So much for this film designed to educate those within the industry. The other film shown in the T. & T. Association meeting was prepared by the Kansas City Railways and designed to educate those without the industry. This film, as presented at Atlantic City, was not in its finished form. It had been very hurriedly put together to enable its showing at the convention and, as exhibited there, was subject to the obvious criticism of being too long and at points uninteresting to laymen. These things will of course be corrected before the film is shown locally. It was developed for the purpose of giving Kansas Citians a better understanding of the tremendous plant involved in giving street car service with which the public has no contact and little knowledge. Having some idea of this plant, such as power house, shops, etc., it was thought that patrons of the company would be better able to comprehend the items of expense which add up to make necessary the present high rates of fare and would have a more sympathetic appreciation of the intricacy of the transportation system.

In this film the convention delegates saw a concrete example of one phase of how the motion picture can be used to foster the public relations of the electric railway, a subject treated at some length in an editorial suggestion on the use of motion pictures, published in the ELECTRIC RAILWAY JOURNAL for Sept. 25, 1920, on page 604. The Kansas City Railways has pioneered in this undertaking and while the film may bear some of the inevitable evidences of an initial attempt, it points the way to what may be done. In last week's issue and again in the issue of this week views of different executives on the general plan are published. We solicit other contributions on this topic as the suggestion is evidently meeting with much interest.

Facts, Figures and Opinions Regarding Railroad Electrification

THE immense audience which gathered in the auditorium of the United Engineering Society's building in New York City on Oct. 22 demonstrated a compelling interest in heavy electric traction, the topic which brought mechanical and electrical engineers together on this occasion. Under the general direction of E. B. Katté, New York Central Railroad, with the co-operation of representatives of the A. S. M. E. and the A. I. E. E., a program of papers was presented, containing information of the kind needed to permit a correct estimate to be made of the present status of the subject. The material was set forth in carefully prepared papers, presenting alternately the respective merits of steam and electric locomotives, one might almost say in debate form. This fact must be kept in mind in reading the abstracts of the principal addresses given in last week's issue of this paper and those of the contributors to the discussion which is printed this week.

The proceedings differed from an "orthodox" debate in that the papers were all prepared in advance, there was no decision rendered on the merits of the presentation and of the question itself by a board of judges, and each side, more or less, admitted the other to have some ground to stand upon. As the discussion proceeded, the need for a co-operative effort to determine the conditions under which electrification is desirable became increasingly evident.

While there will always be differences of engineering and economic opinion regarding the wisdom and practicability of electrifying a given section of track, there ought to be no difference in the aspects of the facts involved. In other words, a fact ought to look the same to an electrical or a mechanical engineer whether he is connected with the operating or the manufacturing side of railroading. The engineer of either type is apt to be prejudiced in favor of the apparatus which he most admires and most fully understands. Again, the manufacturer has something to sell, whereas the operator has much capital tied up in existing equipment and in the development of present practices, which he does not wish to disturb. Each needs general information to offset his own bias. The most helpful function which a meeting like that held in New York can perform is, then, what might be termed the "mitigation of prejudice," or, maybe better, the "stimulation of tolerance." It is to be hoped that some such result will follow and that it will take tangible form.

In getting together the first step is to agree upon a few salient principles or facts. There are some sections of some railroads that obviously are not suitable for electrification, while others ought to be electrified at once, even in the present state of the money market. The reasons in both extreme cases are easy to find. Between these extremes are zones of less definiteness gradually approaching a region of doubt. There are, in each case, certain controlling factors, or "peremptory" factors as they were termed by C. O. Mailloux in an address delivered at the International Electrical Congress at Turin as far back as 1911. Why could not these factors be listed for present and prospective electrifications by a group of competent engineers, say by a composite committee made up of appointees of the railroad and engineering societies? This would not be a formidable task and the result would constitute a piece of really constructive work.

Engineers Seem to Be Getting Together

ONE of the hopeful signs in the transportation and general engineering fields is the way in which engineers are coming to confer more and more upon their common problems. This is illustrated by the numerous joint technical committees which are engaged upon various pieces of constructive work. The New York meeting discussed above shows what can be done by concerted effort. In spite of the fact that the meeting did not settle anything very definite regarding the future of electric motive power, it was well worth while. In our opinion, it was the most successful attempt so far made to get at the facts regarding heavy electric traction experience and comparable steam locomotive operating information. While, as we have already said, the meeting was in a sense more the presentation of arguments than an attempt of each speaker to give a judicial opinion on the issues involved, in this case pleading was entirely in order; in fact, it was expected. The point is that through coming together to hear the subject of heavy electric traction capably presented 1,500 or more interested engineers became better acquainted and they will pull together the better because they did so.

This meeting was the first of a series of joint meetings of the local sections of the two great engineering societies which are to be held this winter. This first one, "staged" by the A. S. M. E. railroad section, set a smart pace for those which are to follow.

A New Chapter in Labor Relations

IT IS seldom indeed that a large employer of labor is paid the compliment and shown the loyalty and support that came to Col. P. J. Kealy upon the occasion of the Oct. 21 court hearing looking to the appointment of a permanent receiver for the Kansas City Railways. This was reviewed briefly on page 893 of our Oct. 23 issue, and another chapter is added in this issue, covering the hearing of Oct. 26. The expression of sentiment referred to came in the form of a petition signed by 3,300 employees who had initiated the petition and financed the engagement of competent counsel, unknown to President Kealy, in order to present their interests to the court. After promising the court, the receivers and the people of Kansas City to "work wholeheartedly and together for the good of the company and the service of the public," and that "under no circumstances will we permit any interruption of this service," the employees petitioned as follows:

> First—That no outside labor interests nor those not in the company's employ be given any part in the present proceedings.
>
> Second—That nothing be done to disturb the present pleasant relations existing between the employees and their officials.
>
> Third—That Col. P. J. Kealy, under whose leadership this organization has been built up, be retained either as a receiver or as the operating head of this company. We have confidence in his ability and we know that the spirit of co-operation he has made possible will result, if possible, in better operation than at present . . .

The reasons cited to substantiate these requests upon the court are significant. The first was supported by the statement that it had been freely reported that those who left the employ of the company during the strike in December, 1918, would attempt either openly or otherwise again to interfere in the operation of the property upon the control passing to new management. The employees went on to point out that the feeling now prevailing among "the employees themselves and the relation between them and the company officials are those of co-operation, mutual help and square dealing," that collective bargaining has been provided for and grievances immediately adjusted, these conditions forming a situation which the employees are very much loath to have disturbed. In support of the second request, and speaking generally as to the man who shall have charge of the property in the future, they voiced the sentiment through their attorney that, with present conditions in mind, the future control of the company should be in the hands of a man to whom they can go, easy to approach and whose duties are not so numerous but that he can give personal attention to the men.

Whatever the outcome of the future in working out the Kansas City Railways' financial situation, it is apparent that the present labor situation, following as it does in the wake of a very costly strike, has very important significance for other companies. Whoever may assume control of the Kansas City property under the court will have the good fortune of being able to start out with a labor situation unusually favorable, for which he may thank the present management.

Accident Prevention Chief Topic Discussed by the Claims Association

S. B. HARE
Retiring President

The Papers and Discussions at the Meeting of the American Electric Railway Claims Association at Atlantic City on Oct. 11-14 Centered About the Subjects of Accident Prevention and Automobile Hazards—Technical and Office Matters Were Also Considered in One Session

J. J. REYNOLDS
President-Elect

THE meetings of the American Electric Railway Claims Association at Atlantic City on Oct. 11-14 were devoted almost entirely to discussions of means for preventing accidents, especially accidents with automobiles, which have grown to constitute such a large proportion of the accidents on electric railways.

The meetings, which were held in Claims Hall on the pier, were well attended and an active interest was displayed by the delegates in the subjects considered.

Monday's Session

A novel feature of the opening session of the association on Monday afternoon was the action of President S. B. Hare in calling upon members to rise in turn, and to state name, company and city. This done he read his address, which appears in abstract below.

ADDRESS OF PRESIDENT HARE

"With the extraordinary growth of transit facilities throughout the country, the increasing business demands for speed and the universal devotion to the 'god of hurry' the most important problem with which the public utilities have to deal is the prevention of accidents. The reduction of the number of accidents among employees and the public is prompted not only by humanitarian motives but by consideration of business expediency and financial profit. It does not make for efficient operation when valued employees are continually being killed or injured and when their places must be taken by less experienced men. A company is maintaining the integrity of its working organization when it safeguards by every means in its power the health and welfare of its employees. Every employee should be made to think and act safety. This applies to every member of the organization from the general manager to the humblest workman. The general manager, the superintendents of departments, the man in authority in any corporation who does not take an active interest in safety and welfare work is a dangerous man. Their greatest business should be to conserve life, limb and property of the employees and the public, thereby conserving the finances of their company.

"The appalling proportions to which accidents have reached in the State of Pennsylvania are enough to make one shudder. During the year 1919 the total number of accidents reported to the Department of Labor and Industry was 152,544; of this number 2,569 were fatal accidents, 38,942 were serious accidents and 111,033 were minor accidents. Children under the age of 16 years to the number of 768 were injured. The dependents of those injured totaled 125,380.

"Government experts have asserted that no less than 98 per cent of all personal accidents are preventable and but 2 per cent are due to defects in machinery and acts of God. Of this 98 per cent 70 per cent are due to thoughtlessness, 15 per cent to bad habits, 10 per cent to recklessness and 5 per cent to ignorance.

"Experience has taught that no marked or lasting results are obtainable unless an educational movement is made general, embracing the various plans that have proved practical. The elimination of thoughtlessness, carelessness, bad habits and ignorance can only be accomplished by education and instruction.

"Local safety drives have proved successful. Their benefit may not be apparent, but comparative figures have shown marked decrease in accidents after such drives.

"In St. Louis, Cleveland and Rochester marked reductions in accidents have followed intensive campaigns. In these cities thorough instruction in safety has been given in the schools. The influence of this instruction on the children, and through the children on the homes, has had much to do with the splendid record made in these three cities.

"A canvass of the automobile situation in the United States at the close of 1919 and a study of the relation between the numbers of automobile accidents and of motor vehicles in use show that the automobile, as much because of the carelessness of pedestrians as of drivers, is now the deadliest machine in America. It is estimated that there are now 7,600,000 automobiles and motor trucks in the United States, an automobile or truck to every third family; one to every fourteen persons, and the manufacturers predict that 2,000,000 automobiles and trucks will have been produced and sold during 1920. During recent years automobile accidents have resulted in approximately one-half the deaths caused by industrial accidents of all sorts.

"During the year 1919, 10,000 persons were killed in automobile accidents. What will be the harvest for the year 1920, when the total will reach more than 9,000,000? It remains for men in our position to offer some positive and lasting solution to this problem.

"Accident prevention should be considered from the financial side also. During 1919, 2,053,277 days were lost through accidents, and the wages lost totaled $8,755,697. Of the 152,544 accidents reported, 57,105 involved compensation to a total of $10,982,836. In public service industries alone compensation was awarded and paid in 3,905 cases, of which 316 were fatal, and the compensation paid amounted to $881,433. In the United States the sum expended by public utilities each year for accidents amounts to more than $300,000,000. Electric railways pay from 2 per cent to 12 per cent of gross income for damage suits and accident settlements.

L. H. ROCHE
Pittsburgh Railways

F. E. SHUMATE
Georgia Railway & Power Company

J. H. HANDLON
United Railroads of San Francisco

THREE OF THOSE WHO CONTRIBUTED PAPERS AT THE CLAIMS CONVENTION

"Statisticians say that 14,000,000 persons will be injured in accidents in the United States within a year and that 100,000 persons will be killed. If accident prevention does not appeal from a humanitarian standpoint, then it can be reasoned out from a financial side with a view of the proposition as one involving a great public trust.

"Accident prevention should be the aim of all. Safety first and safety always should be the watchword of all. 'I am my brother's keeper' should be the universal acknowledgment."

At the conclusion of the president's address Secretary J. S. Kubu then read the executive committee report covering the minutes of a meeting held in Cleveland in January. He also read his report as secretary-treasurer showing how the instructions of the executive committee had been followed during the year. Mr. Hare then appointed as a nominating committee R. E. McDougall, W. F. Weh and William Tichenor.

Next, reports were received from several committees as follows: Mr. Kubu reported for the subjects committee, giving the program outlined at the Cleveland meeting. Mr. McDougall, for the safety committee, recommended active participation in the work of the National Safety Council. H. D. Briggs, for the committee on claims statistics, presented elaborate data compiled by the committee from a questionnaire sent to companies having gross receipts of $1,000,000 or over, covering numbers of accidents, settlements, lawsuits, etc. Finally J. J. Reynolds outlined some changes in the constitution and by-laws which were taken up later, and the meeting adjourned to the joint session with the T. & T. Association. A report of this joint session was published in the issue of this paper for Oct. 16 in the proceedings of the Transportation & Traffic Association.

Tuesday's Session

The session of the Claims Association on Tuesday afternoon was devoted to a discussion on automobile hazards. The main paper on this topic was presented by Ralph Stickle, assistant superintendent accident department Cleveland Railway. There were also written discussions by L. H. Roche, general inspector Associated Bureaus, Pittsburgh Railways; W. G. Fitzpatrick, general claims attorney Detroit United Railway, and J. H. Handlon, claim agent United Railroads of San Francisco. This program was followed except that owing to a delay in its receipt, the paper by Mr. Handlon was not presented until a later session. Abstracts of these four papers appear on another page in this issue.

The discussion which followed their presentation related principally to the laws of the different states in regard to the issuance of licenses for drivers of automobiles and the laws governing automobile operation. Generally, it was found that the casual driver of automobiles was the one most liable to accidents. It developed also that in some states examinations of drivers were not required before a person was permitted to operate an automobile. Failure of the authorities to enforce automobile laws was also held to account for many of the accidents.

Wednesday's Session

The program on Wednesday afternoon covered three papers. The first was entitled "Accidents—Cause and Prevention" by F. E. Shumate, general attorney Georgia Railway & Power Company, Atlanta, Ga. This paper was followed by two discussions of the same subject. The first of these was on "Causes and Prevention of Accidents" by R. N. Hemming, superintendent of transportation Indiana Service Corporation, Fort Wayne, Ind. The second was on "Co-operation of Trainmen" by J. E. Duffy, general superintendent New York State Railways, Syracuse and Utica lines. Mr. Shumate's paper was read by L. F. Wynne, Atlanta; Mr. Hemming's by H. O. Allison, Pittsburgh, and Mr. Duffy's paper was presented by the author. Abstracts of these papers follow:

PAPER BY MR. SHUMATE

After explaining that his company classified accidents under twenty-eight heads Mr. Shumate said that collisions with motor vehicles constituted the largest accident item in Atlanta, after which came collisions between cars, followed closely by boarding and alighting or step accidents.

The streets in Atlanta are narrow and the large amount of riding requires frequent cars. Practically all of the downtown streets are occupied by double tracks, leaving the space between the tracks and the curbs very narrow, with scarcely room for an automobile to pass between the curb and the car. Where parking is permitted in this area, traffic can move only upon the part of the street upon which the tracks are. This makes the transportation situation bad all over the city, with traffic congestion in the downtown districts and reckless running by automobiles in the less congested areas. In the speaker's opinion if the city would pass ordinances to clear the streets of parked vehicles and would institute strict control of traffic there would be a material reduction in automobile accidents. Such an anti-parking ordinance has recently been put in operation in Atlanta applying to all streets in the center of the city between 7 a.m. and 7 p.m., and it has cleared up traffic to an almost unbelievable extent, and while it is impossible yet to determine definitely the effect on auto accidents, the speaker believed that they certainly will be reduced to a considerable extent.

As regards collisions between cars, the speaker believed that carelessness was at the bottom of nine-tenths of these accidents, excuses to the contrary notwithstanding. "Slick track" and "bad brakes" are the excuses advanced most frequently, but the motorman and conductor, before they start out, should know when these conditions are present. It is helpful also for the company to have emergency automobiles equipped with sand bins and sanding apparatus, making the sanding of tracks on short notice possible.

Up to within recently very few cars in Atlanta have had inclosed platforms. Fifteen cars of this type were put in service in January, 1920, and not one step accident of any consequence has been reported in connection with them. The paper urged those who did not have inclosed cars to install doors.

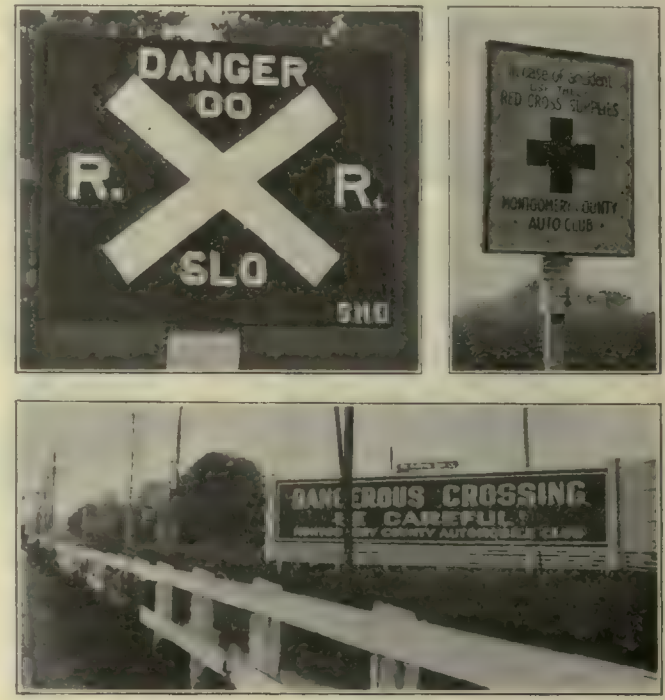
Mr. Shumate's paper also spoke of claims made by persons in, approaching and after leaving cars, caused by defective pavements and conditions incident to paving and repairing streets. Crews should be taught to look out for and avoid stopping their cars at places which do not afford a safe alighting place. If such a condition exists they should be instructed to stop their cars short of the regular stopping place or move beyond it. It has been his experience that the co-operation of crews in this respect is easily secured.

DISCUSSION BY MR. HEMMING

In his paper Mr. Hemming first pointed out some striking facts, as that only 7 per cent of economic human life is covered by insurance, whereas 82 per cent of the combustible property in the country is covered by insurance, and that out of 942 electric railways in this country only 120 belong to the National Safety Council. He believes that all companies should join the council and that each city should have its local safety council.

Continuing, the paper declared that carelessness will thrive so long as it has food to feed on, and that the ever-increasing vehicular traffic constitutes an increasing source of danger. Inexperienced youthful drivers are to be found among the habitual accident breeders, but recklessness is also found in every community among the leading citizens, who assume that their social or political standing will release them from any fine or imprisonment.

Railway companies should burn the story of the need for carefulness into the hearts of the people in their respective communities. Safety must eventually become a part of the daily curriculum of the schools, and the railway companies should come forward in greater numbers in co-operating with the National Safety Council. Every electric railway sets up a yearly fund of at least 3 per cent of its gross receipts for accident claims, but how much is set up for accident prevention? Mr. Hemming asked.



ROAD SIGNS PRAISED BY MR. HEMMING

The same arguments for safety are not effective with all people. Some have to be pushed, others pulled; some have to be thrashed into obedience and others appealed to.

Much can be done at railroad crossings, and the accompanying illustrations show commendable work done by the Montgomery County Automobile Club in Ohio. The signs placed at railroad stations are down low and within vision of the driver and within range of his headlights. There are also massive billboards reading "Dangerous Crossing, Be Careful." Electric railways should act jointly with steam railways in conspicuous billboard displays on the subject of safety. The bridges and viaducts where railroads pass over city streets or country roads afford good places where timely suggestions in life-sized objects, characteristic of location can be shown. In this manner and in many others striking visualizations can be made.

DISCUSSION BY MR. DUFFY

The first way for co-operation pointed out by the speaker was an exchange of information between the superintendent of transportation and the claim department in regard to the details of an accident. Often damages are minimized by crews in making out their reports to the transportation department, and the superintendents are without knowledge as to the facts unless they are fully informed by the claim department as to the results of investigation. The transportation department, therefore, should see that all the necessary information is furnished on the report made by the trainmen, and the claim department after a careful investigation should furnish the transportation department with a statement where witnesses differ from the statements furnished by the trainmen. If there is a difference in facts the matter can be taken up with the trainmen, and this should accomplish good results.

On many properties the constant changing of employees during the war period had a marked effect on the number of accidents, and the larger number of accidents are usually caused by new men. After new employees have been placed on the extra list, they should be carefully watched by the instructor and other officials of the transportation department to see that they fully understand their duties and are careful in their handling of car and passengers. Instructions should never cease, and the necessity for care in the prevention of accidents should be brought to their attention as often as possible. This may be done by talking with the men or by printed bulletins.

Trainmen can best co-operate by freedom from accidents and, if one occurs, by supplying the fullest information as to how it happened and securing the names of the largest number of witnesses. The advent of heavy automobile traffic should only make the motorman more alert in operation of his car and take no chances.

Before these papers were discussed G. B. Muldam of the Underwriters Laboratory, Chicago and New York, explained the service of that organization, which was originally founded by the National Board of Fire Underwriters and is maintained by that board in connection now with the casualty insurance companies. The laboratories pass on the safety qualities of devices submitted to them, whether relating to fire protection or prevention of accidents. Information on these points is available to those interested.

A. H. Ford, formerly manager Cumberland County Power & Light Company, Portland, Maine, and now of the Ford Insurance Company, New York, then addressed the association, mentioning among other things that through an arrangement which he had made with the Underwriters it is now possible for a railway company to secure a policy which will protect it in case of accident where the damage to any one accident is in excess of $25,000, exclusive of the damages to the company's own property or employees; in other words, insurance against catastrophe.

ACCIDENT BOARD AND HONOR LIST

The paper "Accident Board and Honor List" by Alves Dixon, superintendent El Paso Electric Railway, was then read in the absence of the author by R. E. McDougall. An abstract follows:

In this paper Mr. Dixon described a plan by which the company each month posted the names of all trainmen who had no accident for which they were responsible during the previous month and also those who had had such an accident. The posting is done on a bulletin board about 14 ft. wide, 5 ft. high and 6 in. deep, inclosed by sliding glass doors. Each trainman has a separate record card 3 in. x 5 in. and this is hung on a card on one side of the board or the other, depending upon his accident record during the previous month. The card also carries a notation relating to the accident. The question of responsibility is determined at a joint daily meeting of the superintendent, superintendent of transportation, chief inspector and claim agent, but any request for reconsideration of their decision by the man affected is always granted.

Beginning last January, those trainmen whose names appeared for three successive months on the "No Accident" side of the bulletin board received one day off on full pay. This plan has since been followed each month. In addition every man on this honor roll can take a day off for each following month during which no accident is charged against him, but if he has an accident he must again work three months before getting a day off. Eleven months' experience with the plan indicated to the speaker that it was a desirable one.

In the discussion which followed one delegate suggested that the practice of posting the name of the employee responsible for an accident would furnish a good lead for the ambulance chaser, who might in this way get earlier information in regard to an accident than even the claim agent of the property himself.

After discussion, the association then passed a resolution recommending that the American Electric Railway Association become a member of the National Safety Council and that the Claims Association should appoint a committee to work in conjunction with a similar committee from the Transportation & Traffic Association in outlining the work to be done by the two associations in the National Safety Council.

Thursday's Session

The session on Thursday was devoted to a free-for-all discussion on a number of topics of interest to the claims department. The first topic considered was in regard to the increased cost of claims and some of the reasons contributing thereto. The evidence seemed to be that there has been an increase in the amount of settlements. The next question was on the prosecution of claims for damages to company property. The practice in this matter was found to vary, but in general the evidence was that, especially in the smaller cities, smaller claims were not prosecuted, but where the claim, as one representative expressed it, amounted to $50 or $75 or perhaps $200 or $300, the claim was prosecuted.

The next topic was how best to safeguard releases from attack. It developed that some companies took releases under seal, while others did not consider that necessary if the claimant thoroughly understood that the payment was for settlement in full and was satisfied and this fact could be proved in court, and the payment was considered legally "sufficient." There was some discussion also as to the relative advantage of payment by check and by cash. It developed that small sums were often paid in cash, but larger sums usually by check. The next subject was "the best method of keeping in touch with witnesses." One practice described was to procure the name of the nearest relative as well as the occupation of the witness and by whom employed, then when the case is set for trial to get in touch with the witnesses by telephone or personally, notifying them that the case is likely to come up within the next two or three weeks.

The next topic considered was the value of secret service, and one delegate cited a case where a secret service operator had greatly assisted in securing the names of witnesses of an accident. The final subject was the handling of blind and fraudulent cases. In this connection one case was cited where a malingerer who asserted that he had been crippled from an accident was photographed by the company with a moving picture machine in the act of moving heavy potted plants. Later the pictures were shown in court. After several trials the original verdict was greatly reduced.

After a further discussion of the hazards introduced by inexperienced drivers of automobiles, the suggestion was made that at further meetings the association go on record as approving or disapproving the suggestions or policies under discussion, so that the members would know the general consensus of opinion reached by the delegates at the sessions.

OFFICERS FOR ENSUING YEAR

The nominating committee then presented the following nominations:

For president, John J. Reynolds, claim attorney Boston Elevated Railway.

First vice-president, C. G. Rice, manager Associated Bureaus, Pittsburgh Railways.

Second vice-president, Wallace Muir, claim agent Kentucky Traction & Terminal Company, Lexington, Ky.

Third vice-president, W. H. Hyland, claim agent Fonda, Johnstown & Gloversville Railway, Gloversville, N. Y.

Secretary and treasurer, J. S. Kubu, claim agent New York State Railways, Utica.

Executive committee, H. D. Briggs, assistant claim agent Public Service Railway, Newark, N. J.; E. L. Lindemuth, claim agent Wilkes-Barre Railway; C. B. Proctor, claim agent Memphis Street Railway; W. G. Fitzpatrick, general claim attorney Detroit United Railway.

On motion, Mr. Tichenor cast the ballot of the association for these officers.

After a vote of thanks to the president and other retiring officers, taken while the chair was occupied by Mr. Hyland, the association adjourned.

Grand Rapids Safeties Doing Well

More Frequent Service and a Seven-Cent Fare Are Expected to Improve the Financial Showing of Railway

BY OBSERVER

NINETEEN safety cars have been installed on two lines of the Grand Rapids (Mich.) Railway and had been in operation a little more than a month at the time of this writing. The first cars were placed in operation on June 1 and the entire number had been received and put in use by June 24.

The more important line on which the one-man cars were given their initial trial in Grand Rapids was the Cherry Street line. Coincident with the change in equipment a rerouting of lines was placed in effect, so that a definite comparison of the results obtained is impossible. In general, however, it may be said that the Cherry Street line now has a six-minute service to replace the ten-minute headway with the old double-truck cars and in rush hours a five-minute service instead of eight-minute. The same schedule speed has been retained.

The Cherry line was selected for the first safety car installation because it serves a residential section, without any industrial plants or railroad crossings, and has the characteristic that there are few stops at which there are both boarding and alighting passengers in large numbers. The experience in Grand Rapids is that the waiting time at stops is a little excessive if both leaving and boarding passengers must be handled in any number at one stop, and this is the one thing about which the public has made unfavorable comment. The delay which comes from overcrowding is avoided by the use of "car full" signs. As soon as a car coming through Monroe Avenue, the main business thoroughfare, is well loaded, which means about fifty passengers, so that the movement of passengers in the car becomes slow, the operator displays his car-full sign and proceeds without stopping. This not only enables the safety cars to give good regular service but prevents delaying the cars of other lines, practically all of which operate over Monroe Avenue.

When the cars were first installed they were slow on account of the inexperience of the operators in their numerous duties, but after the first few days this sluggish operation had been pretty well overcome. This is the usual experience. The number of collisions with other vehicles also showed a noticeable increase at first, but this is improving as the men become more familiar with the speed and braking action of the light cars.

The most definite example of what the safety cars have done in Grand Rapids in the way of increased earnings and decreased expenses was afforded in the temporary installation on Butterworth Avenue before this line was through-routed with Shawmut. Here three safety cars displaced two double-truck cars and produced an increase in earnings of 14 per cent with a decrease in platform expense of 12 per cent, or a differential of over 20 per cent in favor of the one-man cars, omitting consideration of savings in power and maintenance.

HOW FARE INCREASE WAS HANDLED

The rate of fare was made 7 cents cash, with sixteen metal tickets for $1, by action of the city commission on June 24. This, together with the increased riding due to improved service, is expected to overcome the deficit which prevailed under the 6-cent fare, with nineteen tickets for $1, unless it becomes necessary to increase the payroll substantially at the expiration of the present contract with the trainmen. The present wage scale calls for a maximum of 51 cents an hour, with 9 cents additional for safety car operators.

When the rate of fare was changed the use of metal tokens was discontinued temporarily and paper tickets were used for the new ticket rate. After about a month, when practically all of the metal tokens were in, the paper tickets were discontinued and the same metal tokens again placed in circulation. By this means it was not necesasry to junk the old tokens and substitute new metal tickets of different design. Of course, the paper tickets used in the interim could not be deposited in the registering fare boxes with which a large number of the old cars and all the safety cars are equipped.

Symposium on Automobile Hazards*

THE SUBJECT *of automobile hazards to electric railway companies was introduced at the session of the Claim Agents on Oct. 12 by the paper presented by Mr. Stickle. In this paper the author presents figures of the extent of the injuries from this cause which, he says, should alarm even the most complacent management and care-free public. Much, however, can be done to reduce accidents from this cause and the remedies suggested are listed in his article.*

The tremendous increase in automobiles and the recklessness of chauffeurs have created a serious menace to the safety of all other users of the streets. One whole session of the claim agents at Atlantic City was devoted to a consideration of ways by which accidents from this cause can be reduced

AT THE MEETING *on Oct. 12 Mr. Stickle's paper on automobile hazards was followed by written discussions from L. H. Roche, general inspector Associated Bureaus, Pittsburgh Railways; W. G. Fitzpatrick, general claims attorney Detroit United Railway, and J. H. Handlon, claim agent United Railroads of San Francisco. Each of these authors gives his views on ways in which claim agents can help in this matter. Abstracts of these discussions are published.*

The Automobile Hazard

BY RALPH STICKLE

Assistant Superintendent Accident Department, Cleveland Railway

THE "automobile hazard" is today the greatest risk of the electric railway claim man, one of the most difficult problems of the transportation official, and the public's deadliest traffic menace. It affects not merely company schedules and treasury but the general public welfare.

Just what is the automobile hazard, and how may it be lessened by railway companies, autoists and public?

The auto is the most numerous, as well as the swiftest and most dangerous, vehicle on our highways. Commercially, born with the century, it has increased, with rabbit-like prolificness, from 3,700 in the United States in 1900 (Encyclopedia Americana) to 7,558,848 in 1919 (National Automobile Chamber of Commerce). The world total is 8,837,000. And the number is still increasing. If the entire country were as well supplied per capita as Iowa is, there would be twice as many in the United States as there are. Two million autos are building this year. The manufacturers say there will be one to every family in the country in five years. Admittedly, the auto is a problem in more ways than one. The street railway industry has also expanded—at least physically. In twenty years trackage has increased from 22,589 miles with 61,404 cars (Census Office, 1902) to 48,484 miles with 83,015 cars (*World* Almanac, 1920). Consequently, with the steady increase in the railway business, and the marvelous development of the automobile industry, the traffic problem between auto and trolley has become serious and yearly becomes more serious.

TABLE SHOWING TOTAL ACCIDENTS AND THOSE CAUSED BY AUTOMOBILES, CLEVELAND RAILWAY

Year	Total Accidents	Auto Accidents	Total Claims Paid	Auto Claims Paid
1911	18,948	1,150	$224,694	$8,846
1912	17,953	1,803	232,873	10,687
1913	19,596	2,258	308,634	26,133
1914	21,549	3,270	408,863	31,851
1915	20,018	3,987	361,422	35,195
1916	23,136	5,666	570,829	46,286
1917	26,607	8,242	739,815	*95,144
1918	22,884	7,085	791,072	110,611
1919	24,045	8,078	1,001,846	161,062

* Largest item in classification.

Some figures of the Cleveland Railway since 1911, when a separate classification for auto accidents was first made, may serve to illustrate the growing seriousness of this hazard. The data are tabulated above.

During these eight years the percentage of auto accidents to the total number of accidents increased from 6.1 to 33.6; the percentage of cost to the total accident expenditure from 3.9 to 16.1 per cent. The increase in number of accidents in the 1911-1919 period was 600 per cent; the increase in cost 1,720 per cent.

This is all urban territory, but surburban and interurban districts show about the same condition. In one country division of the Public Service Railway of New Jersey the number of auto accidents increased 345 per cent between 1914 and 1919, and the cost increased 1,445 per cent. In another country division the number increased 452 per cent and the cost 741 per cent. Figures from various parts of the country will show a similar trend. They ought to alarm even the most complacent management and the most care-free public. For these growing accident lists are accompanied by growing death lists.

Here are a few more figures from our Cleveland experience. The company in 1919 had 6,972 passenger accidents while carrying 402,808,820 passengers. In the same period the 80,000 autos of Cleveland had 8,078 accidents with Cleveland street cars. There was one passenger accident for 57,760 passengers, one auto accident for ten autos. Or, to put it another way, 10 per cent of the autos had accidents with street cars. Or again, we had more than a thousand more accidents with autos in the year than we had with 400,000,000 passengers.

Such facts might be multiplied to show the increasing hazard of the auto. Its deadly work, aside from its trolley accidents, might be noted. For instance, the United States Census Bureau lists 6,021 deaths by auto in 1917 in twenty-seven states that kept records of auto casualties. The National Safety Council places the number in the country in 1919 at 11,000 and avers that autos are now causing half as many deaths as industrial accidents, and more than railroads and mines combined. It points out that deaths by auto are increasing in proportion as autos increase.

Claim men are familiar with these facts. They know what the autombile hazard is. What they want to know is what can be done about it?

Frankly, as claim agents they can do little; as publicists much; as advisers, in co-operation with safety men and transportation officials, much more.

Claim men realize the seriousness of the situation as no other class does, for they deal at first hand with the results of the evil. Transportation men know about it, but it isn't their biggest task. The public has been told about it but does not understand its magnitude.

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*Abstracts of papers presented at the annual convention of the American Electric Railway Claims Association, Atlantic City, N. J., Oct. 11-14, 1920.

It should be the business of claim men to try to make transportation men, autoists and the public realize—visualize—see the importance of this problem and solve it. It should be their business, either as safety men or in co-operation with safety men, to lead in solving it.

Little can be done to relieve the claim department in handling auto accidents except to prevent the accidents. The courts might change their attitude on some points, without discriminating in favor of "the rich corporation"—for example, on the doctrine of imputed negligence, or the lack of it. As the law is now interpreted in most of the states a passenger in an auto is responsible for nothing except the prosecution of his claim after he gets hurt. He should assume, or be legally held, to a little more responsibility. But such relief is unlikely soon to come.

There is one thing however, that might be done. The electric railways still are laboring under the incubus of a mass of laws, mostly city ordinances, passed in the last century, when trolleys were the swiftest and most dangerous vehicles on streets and roads. Today they are not the most numerous nor the most deadly users of the streets. That distinction belongs to the auto. These archaic laws, useful simply to furnish grounds on which to maintain damage actions, should be repealed, and laws should be enacted which recognize the auto as the greatest vehicular menace.

Cleveland was freed from eight or ten such antiquated ordinances last summer, thanks to the good sense of the City Council, acting under the advice of its street railway commissioner, Judge Fielder Sanders. One of the repealed ordinances required the motorman to ring his gong at least 100 ft. before reaching each street intersection, and to continue to ring it until he passed the intersection! But it was, and still is, perfectly legal for a pauper epileptic who has just broken out of an asylum and who never before held a steering wheel to take an eight-cylinder car through the densest traffic.

But the real solution is to prevent the accidents. And as reforms, like charity, should begin at home, we should work first on the problem of what may be done by the companies to decrease the number of auto accidents.

How the Employees and Auto Drivers May Help

Employees never will get, or soon will lose, interest in any accident-prevention movement if the management is indifferent. The company which permits dangerous equipment to be used, or neglects to eliminate all possible hazards, will not get its employees to co-operate in safety work. Nor will the public believe in its sincerity.

What motorman will be influenced by a plea for more careful car operation when he knows the management will not help him by so much as removing a bush or trimming a tree that may obstruct his view at a grade crossing?

The Bureau of Safety of the Midwest Utilities Company recognizes this idea. Its first move in organizing for safety work is to attempt to put equipment, car shops, depots, substations and grade crossings in the safest possible condition. For instance, the bureau will take a stretch of track, chart each grade crossing, give figures showing the number and expense of accidents that have occurred there, state the reasons why it is dangerous, attach photographs to prove it dangerous, make a recommendation as to changes, and offer an estimate of the cost. And the recommendations are usually followed.

In this connection there are many improvements, so called, on which operating and safety men do not agree—the near-side stop, warning signals at crossings, etc. But with a "dead man's crossing" in every community through which rails pass, there must be plenty of room for work of this kind on which we all can agree.

When the management has shown its sincerity, then is the time to begin on the employees. Inaugurate a systematic, continuous campaign among the platform men to get them in the right spirit, to make them realize that their personal good as well as the general good will be promoted by avoiding accidents. Point out to them the suffering that carelessness causes. Show them the material loss, and the fact that if they avoid this waste they will profit personally.

Also, operate on the public. Reports show that in large cities a considerable percentage of the auto accidents are with the autos of big employers—taxi, ice, milk and transfer companies, department stores, etc. Why not get in closer touch with such organizations? If a railway company were prepared to send a well-equipped speaker to address gatherings of taxi drivers and delivery men on the question of auto accidents, how to prevent them and what to do if they happen, the drivers' employers would be glad to furnish the audiences. And it would be constructive prevention work; it would help to prevent accidents and to prevent lawsuits if accidents happened.

Changes Possible in the Laws

We should take more interest in the prosecution of persons who violate safety ordinances and laws. Laws are of little consequence unless enforced, and when the violation of a safety law is clear and the proof certain, we should get back of the prosecution.

But when it comes to reforms, it is human nature to think that most of the reforming should be done by the other fellow. We are not exceptions. We feel ourselves more sinned against than sinning. Every claim man believes, and every operating man is certain, that the vast majority of auto-trolley collisions is the fault of the autoist. Investigation by the National Safety Council of 18,000 such collisions places the blame wholly on the driver in 64.2 per cent of the cases, and wholly on the motorman in only 8.1 per cent of the cases. Even semi-hostile authorities agree with us. Of sixteen auto club secretaries, fourteen thought autoists more careless than motormen. Two thought the fault was fifty-fifty.

Without exception, auto clubs, civic bodies and traffic officials are convinced there should be decided changes in auto and traffic laws, and more stringent enforcement of the laws.

Traffic laws in state and nation should be uniform. The obligations and rights of the driver and the pedestrian should be defined clearly, and should be general in application. As it is, a city's regulations frequently are different from those in its suburbs, and a traffic virtue in one county may be a misdemeanor in the next. Who can tell whether it is permissible in the next town to pass a street car on the left side, turn in the middle of the block, or run by a standing trolley?

The electric railway section of the National Safety Council, recognizing the safety feature of uniform traffic laws, is working with auto clubs and police departments on this, and something may be accomplished.

Two years ago our Transportation & Traffic Association named a committee to work on this subject, and a model traffic ordinance has been drafted. One feature of this model ordinance that would be particularly helpful in preventing auto-trolley mishaps and in protecting the companies from unjust claims is the creation of "main thoroughfares." In many of our cities ordinances give traffic in certain streets the right of way. But these ordinances generally mean little or nothing, being neither enforced as traffic regulations nor of benefit as a defence in damage actions. The practical effect of the establishment of "main thoroughfares," which, of course, would include street car streets, would be to compel the drivers of autos or other vehicles crossing or entering these favored streets to "stop, look and listen."

It is surprising but true that few cities have done anything to limit the weight, size or width of trucks. Yet in addition to destroying pavements and roadbeds and congesting traffic, cumbersome, over-wide trucks are responsible for many accidents. No one questions the wisdom of curbing the truck builders, but how little has been done to curb them.

A model traffic ordinace necessarily includes parking regulations, the lack of which is a fruitful source of auto-trolley accidents, and a great slower of schedules. It affects the general public more adversely than it does the railway company, yet little has been done, except possibly in New York City, to correct the evil. There is popular sentiment in the larger cities in favor of more stringent parking regulations, including a no-parking rule on "main thoroughfares." Of course the companies should do what they can to get back of such sentiment.

It is axiomatic that autos and street cars cannot collide if they do not meet. They could be kept out of each other's society to a considerable extent by a separation of traffic. Why do we not boost the idea of "street car streets" and "auto boulevards?" It is coming. And it will lessen materially the automobile hazard in urban territory. The auto clubs favor it, and it will be an accomplished fact as soon as the public is shown that the expense will be small compared with the benefits from fewer accidents and improved traffic conditions.

Will you permit another reference to Cleveland to illustrate? A double-deck bridge across the Cuyahoga River and connecting with an auto boulevard was opened about Jan. 1, 1918, relieving auto traffic on parts of five "street car streets." In the railway division which includes these five streets our auto accidents decreased from 3,903 in 1917 to 2,710 in 1918 and 2,704 in 1919. On every other division there was an increase.

The public demands that motormen be trained to avoid accidents. There is another class that should be trained similarly--the traffic police. Only trained officers are permitted to search pawnshops for stolen goods, but it still seems to be *au fait* for police with no training to take a turn handling traffic—at least, in some cities. We have not fully awakened to the necessity for larger and better-trained traffic forces.

State and county could help to avoid accidents at grade crossings by placing warning signs at a fixed distance from crossings. These should be distinctive and uniform, and their usefulness should not be impaired by permitting advertising "warnings" in the vicinity. This brings us to the most important and radical reform of all, a real driver's licensing law. Small wonder Europe knows us as "careless America" when we show an absolute disregard for and indifference to the very essentials of safety. To permit any one who wishes to do so to drive an auto is such disregard. Except in a few states, any one may drive, or attempt to drive, an auto who can get the auto. True, in some states he must have attained a certain age and be sober, to a degree, but physical or mental fitness and knowledge of driving are of no consequence.

Licensing laws have been enacted in New Jersey, Massachusetts, Connecticut, New Hampshire, Maryland, Pennsylvania, Rhode Island and possibly one or two other states. Reports from safety officials in these states indicate that the effect has been good, although there is a feeling that the revocation and suspension features of the acts have not been invoked sufficiently. But this is a detail depending for its enforcement upon public opinion. It should be reasonably easy to get a driver's license in the first instance, and reasonably difficult to keep it. Probably every man in this room knows drivers he is convinced are unfit to drive. Every one cannot be a driver, any more than every one can be a Napoleon or a Babe Ruth.

Immature, intoxicated, feeble and mentally deficient persons should not drive, not to mention those who do not know how to drive. Where they have received licenses, prompt suspension or revocation should follow when their failing has been demonstrated. Police, insurance and railway company records in every city will show certain drivers who have had repeated accidents. Usually this is not chance. It is evidence of unfitness to drive.

Restrictions should be particularly severe on professional drivers, chauffeurs and truck drivers, who too often are temperamentally unfit and financially irresponsible.

CONCLUSIONS STATED

To recapitulate: The following ideas would tend to lessen the automobile hazard:

1. Repeal of antiquated anti-trolley legislation.
2. Improvement of the physical property.
3. Systematic continuous safety work among employees.
4. Propaganda directed toward the education of the public.
5. Uniform traffic laws in state and nation for:
    (a) Creation of main thoroughfares.
    (b) Proper parking regulations.
    (c) Separation of traffic by creating or establishing "street car streets" and "auto boulevards."
    (d) Uniform warning signals at grade crossings.
    (e) More and better trained traffic police.
    (f) Limitation of size and width of trucks.
6. Prosecution of safety law violators.

Individually and as an organization we should be working on these problems. As an organization we should try to arrive at some united understanding of what is wrong, and what we want, and then as a unit strive for it. It is not a subject in which we alone are interested. Every thinking person and every wide-awake public or semi-public body is seeking information on this subject and making suggestions. We should be alert to the opportunity to make our influence felt, to get what we want and need. There is scant sympathy for the man or organization that takes no interest in the discussion of proposed legislation and then objects to it when enacted.

But, after all, laws enacted or repealed, and traffic rules changed or perfected, will not eliminate the auto hazard. Accidents do not happen; they are caused. The careless person will continue to have them; the careful person will avoid them, laws or no laws.

The personal element is the vital factor. Most accidents are the result of human failing, not of mechanical defects. The auto or the street car itself rarely causes the trouble. The motorman says, "The brakes would not work." The difficulty was he did not work the brakes. Carelessness or ignorance, and who can say where is the line of demarcation between the two, is the predominating cause of accident. Great progress has been made in the war against accidents, but much remains to be done.

Let us do more than work for the enactment or repeal of laws or the correction of mechanical defects. Let us support and promote intelligent, continuous effort to make America careful. The task will be accomplished when once the public awakens to a realization of the suffering and waste that come from carelessness.

Discussion on the Automobile Hazard

By James L. Roche
Chief of Inspection Bureau, Associated Bureaus
Pittsburgh Railways

Education of Motormen and Chauffeurs Will Help, but Stricter Laws Are Also Necessary—The Pennsylvania Law on Responsibility of Passengers in Automobiles for Their Own Safety Is Cited

THIS paper is presented on the presumption that we are agreed that the motor vehicle hazard is our greatest one and that we are all doing our utmost to prevent this particular kind of accident as far as the education of our own men is concerned. If that be true, then the burden is entirely upon the motor vehicle driver and owner and the discussion is continued with that viewpoint. Regardless of the careless acts of the motor vehicle driver—in fact, because of them—we must redouble our efforts with our own men. Everything possible for their safety education should be done, making clear to all men—especially the new men—the great danger of automobile accidents. A safety organization is almost indispensable to the present-day traction company.

There are today approximately 7,500,000 motor vehicles in the United States and if the calculations of the motor manufacturers are correct there will be 12,000,000 motor vehicles in this country in 1923. The amount of capital invested in the automobile industry has been estimated at $1,297,000,000, and the industry has become the third greatest in the country. Along with the phenomenal growth, new and heavier types of machines were introduced until they rival the locomotive in speed, and with the continued increase in the number of machines and the improvements in speed and endurance, together with the increased size, came the greater number of accidents. These have increased to such an extent that the automobile hazard has become our greatest one and it is well that we take serious consideration of the situation and endeaver to do our share to cut down the number of these motor vehicle accidents. The motor vehicle has continued to expand beyond all human expectation. Self-starting devices and other improvements have made it possible for any one to operate it over the age of fifteen. But the sense of obligation to exercise a degree of care commensurate with the increased risk has not developed, and we have reached the stage where rights and privileges have run wild, with nothing much more to curb them than the individual's sense of responsibility.

Owners and employers are beginning to recognize the folly of placing a poorly trained or incompetent man in charge of the commercial vehicle. In the larger cities of the country successful schools have been held for the education of chauffeurs. These schools have been conducted in Pittsburgh, St. Louis, Detroit, Rochester, Milwaukee, etc. They have been attended by from 200 to 800 drivers and a regular course of lectures has been delivered. Bonuses have been given by employers to drivers who attended the entire course and no doubt great good has been accomplished by the National Safety Council, which conducted these schools. In Minneapolis, within the past two months, a successful school graduated sixty drivers. At all of the meetings there were in attendance from 200 to 300. It is suggested that in the territories not covered by the National Safety Council the local claim departments conduct such schools. Full information as to the proper manner and the subjects covered can be readily secured from the headquarters of the National Safety Council at Chicago.

Education will play an important part in the prevention of accidents arising out of the use of motor vehicles. A proper understanding of the hazards of the road, of the rules and regulations for the government of the machine and a decent regard for the rights and safety of fellow travelers will prevent accidents. It would seem as though the automobile manufacturer and the sales agency should take an active interest in this particular matter of education. The time is fast coming when the manufacturers will be caught up with their orders, and they will be forcing the sale of their machines. Why not sell the safety idea with the machine and spend some time with the new owner, teaching him the laws and rules of the road, and above all, impressing upon him the way accidents happen and how to prevent them.

For the habitually careless we must depend upon the laws that are made to control him. The ones with which I am familiar are either not severe enough or are not enforced as they should be, in my opinion. A locomotive engineer must spend years of apprenticeship and pass strict examinations before he assumes command of his engine; a motorman is taught the mechanism of his car and spends a considerable time with an instructor before he is permitted to operate his street car; even the man in charge of a stationary engine or boiler is subject to governmental supervision, yet any one not badly crippled, who has the money, can purchase an automobile and with the least amount of instruction take his place with thousands of others on our streets and roads and attempt to operate this dangerous vehicle. I believe that strict laws must be enacted to govern those who may be permitted to drive a motor vehicle and that they must be enforced by conscientious safety officials.

The automobile hazard has become so great that the courts are beginning to recognize it, as is indicated in the following summary of the legal standing of the motor vehicle by Mr. Chief Justice Cullen of the Supreme Court of New York State:

> That the motor vehicle on account of its size and weight, of its great power and of the great speed which it is capable of attaining, creates, unless managed by careful and competent operators, a most serious danger to other travelers on the highways and to occupants of the vehicles themselves, is too clearly a matter of common knowledge to justify discussion. The fatalities caused by them are so numerous as to permit the Legislature, if it deemed wise, wholly to forbid their use.

We find in our territory that owners are either ignorant of the law governing licenses or care not whether they violate it. Licenses are issued, of course, for one particular machine and no other. Exchanges of license plates from one machine to another are not infrequent. A man may buy a second hand machine and retain the plates of the former owner; dealers sometimes allow a machine under their dealers' license to be used for hacking or other purposes and a man may purchase a new machine and use thereon his old license plates. We subscribe to the published lists of motor vehicle owners, which gives the license number, name of the owner, name and description of the machine and manufacturer's number and in all of our accident cases compare the license number and manufacturer's number with the official list. In case the machine is being operated under a wrong license number under our law it is a trespasser upon the highway and the legal right of the owner to recover damages is at least under question. We are furnished also with a list of drivers and their license numbers as issued and are prepared to check their number or to learn whether they have a license to drive a motor vehicle.

The Public Safety Section of the National Safety Council is making a special study of the automobile hazard. I believe that it needs our help and that we need its and that some effort should be made to co-operate with it. It is definitely committed to the solution of the problem and is now beginning a thorough-going campaign of education through organized community effort, publicity, chauffeurs' schools, public schools and special bulletins. The seriousness of the problem is revealed in the following four striking facts:

1. There were approximately one-half as many people killed by automobiles in 1919 as in all the industries, mines and railroads in the United States.

2. Deaths from automobiles are increasing each month with the increase of the number of automobiles.

3. While in the United States not more than one-fourth of the people are exposed to industrial hazards, practically every person, the moment he leaves his doorstep, is exposed to the automobile hazard on the streets.

4. While in the industries, through organized safety, the hazards are coming under control and accidental deaths are being reduced, the fatalities from automobile accidents are mounting by leaps and bounds and we have barely made a start toward the solution of this new problem.

Recently in the city of Washington, D. C., the Public Safety Department made motion pictures of the proper ways to turn at street intersections, showing them at the different motion picture theaters; the city of St. Louis sent a representative to visit the other large cities of the country to study traffic problems and conditions and their solution, in an effort to cut down the accidents on their streets; the city of Pittsburgh is about to organize a traffic court to handle traffic violators only; at the recent first meeting of the national committee on highways and highway tranportation plans for a nation-wide publicity campaign through the newspapers and motion picture theaters were considered to teach traffic regulations and the dangers of the streets, and a committee was organized by P. P. Claxton, United States Commissioner of Education, on the advice of President Wilson for investigating the advisability of teaching traffic regulations in the public schools. Efforts of a similar character are being made throughout the country, all tending to the education of the public, that the number of street accidents might be reduced. The State of Pennsylvania has already established by law the study of safety first methods in the public schools.

Surely we are all agreed that no person should be permitted to operate a motor vehicle without a license and that he should be required to pass a strict examination as to his fitness not only mentally and physically to handle a motor vehicle, but also as to his knowledge of the mechanism of his machine.

In suburban territory where the highway crosses our interurban tracks it should be a requirement that the driver of a motor vehicle stop, look and listen in the same way that some states require the driver to act when approaching railroad tracks. On our city streets it should be a misdemeanor for a motor vehicle to pass a street car on the left on double track streets.

The law should clearly state that where there is a good roadway beside the street car tracks no motor vehicle should occupy the tracks, and make it a misdemeanor for a driver to pull across the tracks directly ahead of the street car. A speed limit of 15 m.p.h. or less should be maintained within the limits of every city and village in the country. These provisions in addition to the present automobile laws will not be made unless we lend our influence toward this end.

I believe that the association could well appoint a committee for the purpose of making a canvass of all the traction companies in the country to learn the increase in automobile accidents and just what is being done in each locality to prevent such accidents, so that we may get ideas from all over the United States and to secure copies of the automobile laws from each state and make up a model automobile law. This latter would be for the purpose of co-operating with the National Safety Council in securing the passage of such a law in as many states as possible.

One particular menace that we have to contend with in the streets of our territory is the savage mail truck. It has become so notorious in the way of running into street cars and running down men, women and children that the newspapers have taken a decided stand in their editorial columns toward abating the nuisance, and the Public Safety Department gave official warning to the Post Office Department within the last month that it would from then on wage a vigorous warfare against its careless drivers. Young and inexperienced drivers seem to be the cause apparent from the outside and it may be that they have careless supervision, and there is no way of collecting a cent for the damage they do. If this evil is as great in other localities, the association may deem it proper to officially call it to the attention of the Government authorities.

Mr. Stickle mentions the matter of the doctrine of imputed negligence and regrets the fact that in Ohio the passenger of the motor vehicle is responsible for nothing except the prosecution of his claim after he gets hurt. I am glad to report that in Pennsylvania we have a decision of the Supreme Court of the State in Dunlap vs. Philadelphia Rapid Transit Company at No. 4,762, Dec. Term, 1912, Common Pleas Court of Phila. County, filed June 5, 1914, in which plaintiff was a passenger in the automobile which was in collision with a street car. It was held that the driver was guilty of contributory negligence, but the same was not imputed to the passenger, yet the passenger was also guilty of negligence in saying or doing nothing when the operator of the automobile approached the crossing without proper precautions. A verdict for plaintiff was reversed and entered for the defendant.

We have done in Pennsylvania just what Mr. Stickle suggests in the doing away with the antiquated city and village ordinances. The Pennsylvania automobile law supersedes and repeals all city and borough ordinances pertaining to the motor vehicle and is the only law governing them inside and out of the city and borough limits.

Before the birth of the chauffeurs' school we had in Pittsburgh attempted something of the kind. The experience may be worth relating to member companies where chauffeurs' schools cannot be regularly conducted. We arranged meetings with the chauffeurs of the different department stores, ice companies, taxicab companies, reduction company, milk companies, etc., and gave them safety talks. I happened to be the one chosen for the work and it lasted all of one season. I spoke before from 40 to 300 chauffeurs and drivers at each meeting and felt from the beginning that some good was being accomplished. The employer we found, in every instance, only too willing to co-operate.

To summarize, I believe that we have the following methods to help combat this growing hazard of the motor vehicle:

1. Maintain persistent and consistent safety efforts with our own men.
2. Encourage and assist in the formation of chauffeurs' schools or conduct lectures among chauffeurs and drivers whenever and wherever they can be drawn together.
3. Watch the enactment of state laws and through state organizations or individual companies assert ourselves with a view of getting into the laws favorable articles, particularly:
    (a) Stricter provisions as to granting licenses to drivers.
    (b) Lowering the speed limit in cities and villages.
    (c) Providing for drivers to stop, look and listen at suburban crossings.
    (d) Providing that drivers in city streets cannot turn against the current of traffic in two-way streets.
    (e) Providing that motor vehicles cannot occupy the street car tracks, and making it a misdemeanor to cross directly ahead of a street car.
4. Co-operate with the National Safety Council in efforts to reduce motor vehicle accidents.
5. Appoint a committee to make a survey as suggested above.

Discussion on the Automobile Hazard

BY JOSEPH H. HANDLON

Claim Agent United Railroads of San Francisco

Forty-seven per Cent of All Accidents Involving the Cars of the Author's Company Were in 1919 Automobile Accidents—An Outline of What Can Be Done

AT A RECENT safety-first gathering, the principal speaker, a man of national reputation in accident prevention work, made these remarks:

> The automobile is the most deadly weapon known to mankind. I think it can be safely stated that automobile fatalities are now happening at the rate of 15,000 a year—forty-one every twenty-four hours—an average of one every thirty-five minutes.
>
> The economic loss to a community caused by automobile fatalities is well illustrated by the careful estimate that the earning capacity of the 599 persons killed by automobiles in the city of St. Louis alone in the last thirteen years would have been more than $12,000,000.

It is to be noted that no reference was made to the thousands of persons who are injured by automobile accidents yearly, and what that means to a community, or the millions of dollars' worth of property destroyed annually in such accidents due to somebody's carelessness.

Recently I wrote to the coroners of twenty principal cities of the United States seeking information as to the number of persons killed directly or indirectly from automobile accidents each year during the past five years in their respective cities. Seven of these coroners have so far not replied, but in the remaining thirteen cities there was a total increase in automobile fatalities during the year 1916 as compared with the year 1915 of 23 per cent; an increase in 1917 over the preceding year of 84 per cent; in the year 1918 of 21 per cent; and in the year 1919 of 24 per cent; showing a steady growth in the number of such accidents. The year 1919 compared with the year 1915 reveals about 200 per cent more fatalities from automobile accidents.

To what extent are the electric railway companies suffering from these appalling conditions?

In 1910 but 6 per cent of all accidents involving the cars of the United Railroads of San Francisco were automobile accidents, in the year 1911 but 9 per cent, in 1912 but 12 per cent; in 1913 the percentage had increased to 15, in 1914 it was 17, in 1915 it was 32 (due mainly to the advent of the jitney), in 1916 it was 34 per cent, in 1917 it was 32 per cent (when jitneys commenced to diminish in number), in 1918 it rose to 43 per cent, and in 1919 to 47 per cent; so that today approximately one-half of the total accidents in which the above company is concerned are automobile accidents.

It may be asserted that there was a corresponding decrease in horse-drawn vehicle accidents. Such is not the case. During the year 1910 only 27 per cent of all accidents were horse-drawn vehicle accidents and in 1919 the company's records show all such accidents were 5 per cent of its total number, making a decrease of but 22 per cent.

Statistics just received from seventeen street railway companies operating in large cities disclose some impressive figures. During the years 1915 to 1919 inclusive the total number of automobile accidents in which these companies were concerned was as follows:

Year	Number of Automobile Accidents	Increase Over Preceding Year	Percentage of Increase Over Preceding Year
1915	32,912	......	.
1916	46,109	13,197	40
1917	61,017	14,908	32
1918	64,771	3,754	6
1919	76,420	11,649	18

The increase in the number of automobile accidents involving the above companies for the year 1919 as compared with the year 1915 was 132 per cent.

WHAT DOES THE FUTURE OFFER?

What does the future offer in the matter of eliminating this alarming condition of affairs?

In a recent magazine article a well-known writer on economics who is qualified to make an intelligent survey of the automobile industry stated that it is easily the third industry of the day, ranking next to steel and cotton, and perhaps, by the census of 1920, over-reaching both of these. It is conservatively estimated that this nation could buy and continuously operate 12,000,000 automobiles without reaching what might be called the point of saturation.

With an automobile to every six persons in the state of Iowa and the young men of today placing their savings of $500 as first payment on an auto instead of in a home or a farm, some impression is obtained of the conditions with which the companies will have to battle in the future.

CAUSES OF ACCIDENTS

What are the causes of automobile accidents that directly concern the drivers of automobiles?

Here are some of them: Reckless driving; speeding; violation of traffic rules due to ignorance, a careless disregard of the law or a craving for excitement; inexperience; incompetence of chauffeurs arising from deformed or amputated limbs or defective eyesight, hearing, epilepsy or heart trouble or due to the fact that they have not reached years of discretion, or possibly they are in their dotage, or again they may be mentally inactive or ill balanced; irresponsibility, since some of them do not have a proper regard of their obligations to their fellow traveler, whether he be a driver or a pedestrian, or in their anxiety to "beat the other fellow" they will take an unnecessary risk, and again there are others who are irresponsible because they assume a carefree attitude arising from the fact that they carry liability insurance.

So far as the automobile itself is concerned we find that many accidents are due to faulty construction or defective brakes, lack of the use of mirrors or satisfactory headlights or tail-lights at night and absence of non-skid equipment in wet weather.

Again, automobile accidents arise from the lack of uniform traffic rules governing the operation of automobiles in all states of the Union; also there is no uniform method of placing warning signs at danger points or grade crossings; no standard type of warning signs; no specific signaling device at crowded street intersections; no uniform method of signaling by one driver of a vehicle to another; no standard rules requiring automobiles to surrender the right-of-way to vehicles operated on rails or automobiles proceeding toward the same intersecting point, and the additional fact that our streets were never designed to meet the congested traffic conditions the automobile has created.

WHAT CAN BE DONE?

What can we street railway claim agents do toward eliminating automobile accidents, especially where our individual companies are concerned?

I would suggest that by means of lectures or personal instruction all trainmen be shown numerous types of automobile accidents and taught how to avoid them. Sketches, lantern slides or motion pictures can be well utilized for that purpose. A map can be maintained at each carhouse upon which there could be placed colored pins indicating the location of automobile accidents as well as other accidents that occur from time to time, so that trainmen could familiarize themselves with the danger points on the routes over which they operate their cars. The co-operation of trainmen should also be sought in having them report all traffic violations so that the police can be notified.

Efforts could be made to prevail upon the local authorities to compel all drivers of vehicles to pass a physical examination; to place age limits between which ages a person must be, else he will not be allowed to operate an automobile; to require applicants for chauffeurs' licenses to furnish satisfactory proof of their ability to operate an automobile before being given a license; to compel each chauffeur to carry a card with his photograph attached showing that he has passed a satisfactory examination before being allowed to drive a machine, on the reverse side of which should be recorded all arrests for traffic violations; to have the traffic officers maintain a card index system of traffic offenders so that the police magistrate will have a record of any violation of a local traffic law previously committed by an offender; to induce police judges not to fine the continual offender, but either to commit him to jail or to impound the vehicle so that neither he nor his family can use the machine for a specified period, all storage charges meanwhile to be paid by the convicted person; to enlist the co-operation of the local automobile association in eradicating from their ranks the traffic-law breaker; and to impress upon taxicab companies, motor drayage and delivery companies and other large users of motor vehicles the company's desire to enlist their aid in the work of accident prevention. Warning signs can be placed to advantage in garages, especially those illustrating different types of accidents and their causes.

MODEL TRAFFIC ORDINANCE

In the matter of state laws governing motor vehicle traffic, the officials of the International Traffic Officers' Association which recently convened in San Francisco had hoped to formulate a universal traffic law which would apply throughout the United States and Canada, but the limited time at their disposal prevented them from accomplishing all they desired. The subject was referred to a committee, which will meet during the winter in Cleveland, Ohio. The chairman of the committee, W. H. Maltbie of the United Railways & Electric Company of Baltimore, who is a member of a committee appointed for a similar purpose by the American Electric Railway Association, submitted a proposed model traffic ordinance which is being used as a basis for drafting an ordinance that will have the approval of the International Traffic Officers' Association.

It was very evident to a person attending the convention that further co-operation will have to be sought from such organizations as the American Bar Association, the National Safety Council, the American Automobile Association, the Automobile Manufacturers' Association and similar bodies before a code of traffic laws that will apply everywhere so as to meet with universal approval will be adopted by all of the state legislatures.

For the present it may be possible to secure the passage of a statute that will compel owners of automobiles to file with each secretary of state or with the State Motor Vehicle Department duplicate insurance policies which will indemnify each occupant of the automobile up to $5,000, in event of accident, or require automobile owners to file a bond or establish proof that they are financially responsible; further requirements should be the filing of an additional insurance policy or bond for $5,000 to indemnify a person injured who was not a passenger of the automobile.

In advocating such a measure let me suggest that claim agents realize perhaps more than any other class that very often the bread-winner of the family is injured, perhaps permanently and sometimes fatally, and the burden of supporting his dependents usually falls upon the community when the person found responsible for the injury is financially unable to meet the judgment imposed upon him.

Responsible liability insurance companies, under those circumstances, as an economic necessity, would refuse insurance to those known to be careless, reckless or incompetent, and the companies that assumed such a risk would charge so high a premium that careless or negligent automobile owners, in their efforts to qualify in the "preferred risk" class, would drive more prudently.

Another proposed statute deserving of much consideration would be one imputing the negligence of the driver to the occupants of the automobile so as to eliminate the common occurrence where the passengers in the automobile recover for an injury solely due to the driver's negligence.

The problem of accident prevention so far as automobiles are concerned is now becoming more and more important in the public eye and we as accident specialists should deem it our duty to take an active part in this work of further educating the public to the seriousness of the problem now so acute. Further, we should endeavor in every way to devise and urge the adoption of various methods of minimizing this evil which is of such recent origin and yet so dangerous to the body politic.

Discussion on the Automobile Hazard

By WILLIAM G. FITZPATRICK
General Claim Attorney Detroit United Railway

Among the Topics Considered by the Author Are Accident Maps, Recent Court Rulings and Settlements With Insurance Companies

AN ANALYSIS of the reports of the various cities of the country discloses a tremendous increase in vehicular accidents as the growth of the automobile industry has increased by leaps and bounds. This condition has been found in the city of Detroit. For the year 1919 the number of reported automobile accident cases on the city lines was 11,564, which shows a large increase over the previous years, and for the first six months of 1920 the total number of reported cases in the city was 7,764, which would be at the rate of more than 15,000 a year.

In some respects the situation in Detroit in regard to the motor hazard is peculiar. Detroit is the center of the industry, and the increase of automobile ownership in the last few years has been very great. There have been but few additions to the railway permitted by the city authorities, and the rapidly increasing population of the city must be accommodated on practically the same lines as have existed for a number of years. A great many automobile factories being located in Detroit, a very large number of testers and demonstrators help to swell the automobile traffic. The street railway lines of the city all converge in the center of the business district. Many of the lines are constructed upon very narrow streets, which of course increases the hazard. Before the company was permitted to reroute one of its lines which crossed Woodward Avenue, so as to avoid this crossing, the corner of Michigan and Woodward Avenues in the city of Detroit was the most congested corner for traffic in the world.

I heartily agree with the suggestions for lessening this hazard outlined in Mr. Stickle's paper. The suggestion as to improvement of physical property, of course, is very much to be desired and is perfectly feasible for each company. Suggestion No. 3 as to "systematic continuous safety work among employees" is extremely important and I had assumed it was being carried out by most of the larger companies.

Suggestion No. 4, recommending propaganda work, is being carried out in Detroit, and the company has devoted weeks to this purpose. About a year ago I had prepared a blue-print map, about 5 ft. x 7 ft., of the lines of the urban system, showing all intersecting streets and congested areas. On this map were put red-top pins, indicating the locality of every motor vehicle accident as shown by the crews' reports from day to day for a full month. At the end of the month, two additional maps were "pinned up." One went to the general manager's office, another to the general superintendent's office for use in the crew instruction section, and the other found a place either in the lobby of one of the larger automobile clubs or in the traffic squad room of the police department. The maps were also exhibited in the windows of the interurban station. The maps were repeated about every third month. I am told by our operating department that effective use was made of these maps with the crews, especially the new men who were breaking in, and the data indicated were used with good results by the police department in its "safety first" and "safe driving" campaigns. As a graphic chart of conditions, the red pins on the blue and white background makes more than a passing impression.

RIGHT OF WAY AT RIGHT-ANGLE CROSSINGS

Subdivision 5 for uniform traffic laws in state and nation is of course "a consummation devoutly to be wished," but experience in other lines teaches that this is a slow and uncertain process.

It does seem to me, however, that we can adopt a policy with reference to automobile accidents which will eventually greatly reduce the hazard and more thoroughly educate the drivers of automobiles in a practical way than any theoretical instructions. This is in regard to right-angle crossings where a large proportion of automobile accidents occur. Some jurisdictions have recognized the justice of giving the street cars right of way on all street car streets. An ordinance of New Orleans gives the right of way "along such tracks," and the traffic laws of New Jersey provide that "street cars shall have the right of way between . . . cross streets over all other vehicles." The Detroit United Railway has adopted as a policy on its lines absolutely to refuse to settle claims growing out of right-angle crossing accidents unless the facts are overwhelmingly against the company. In refusing to consider appeals for compromise in these right-angle cases, the company has the backing of a recent decision of the Michigan Supreme Court on the subject (Colborne vs. Railway, 177 Mich., 139), where the court lays it down as the duty of the automobile driver "before passing into the line of danger from his place of safety where he had ample opportunity to observe without obstruction . . . to assure and reassure himself that there is not a car directly upon him, of which situation the fact that he is struck is conclusive proof. . . . He should have made sure of the safety of proceeding by looking just before entering upon the track and at such a point that he could stop his machine if necessary in order to avoid a collision."

The court in this case, recognizing the "automobile hazard," insists that the rule of conduct with respect to crossings by pedestrians should be as strictly applied to automobiles, and that the reasons for such application are more impelling, as the careless pedestrian as a rule perils only his own safety. Continuing, the opinion says: "In the light of common knowledge courts can well take judicial notice of the automobile not only as a most useful and pleasing means of swiftly transporting persons and property for pleasure or business when properly controlled and cautiously driven, but as a vehicle in its possibilities so destructive when in the hands of careless and reckless drivers as to spread over the land the maimed and dead until it has belittled the cruelties of the car of the Juggernaut."

When drivers of automobiles become convinced that they cannot carelessly and recklessly cross street car tracks and expect in case of an accident to secure a speedy settlement, they will learn to exercise that degree of care which will avoid the great majority of collisions. There is in my opinion absolutely no excuse for a collision between street cars and automobiles at right-angle crossings. It is not like two automobiles meeting at an intersection where one might not reasonably expect the other. In case of street cars, the tracks are there, and known to be there, and a street car may be expected coming in either direction at any moment, and it should be the duty of the casual vehicle approaching those tracks to take every precaution for safety. I find from my experience in this regard that while the number of accidents may not have been decreased, the number of claims in such cases has.

Another suggestion which I desire to impress upon this body is that more care should be taken in the settlement of cases with insurance companies. Many insurance companies have a policy of making a liberal settlement with claimants, then go to the railway companies hoping to get all, or as large a proportion as possible, from them of the money expended by them. I have therefore adopted the policy of inquiring first whether a claim has been adjusted by the insurance companies before application is made for the payment of the claim by my company, and I am in every way discouraging settlements in these cases. If the insurance companies are put to the trouble of fighting these claims through their assignments, they will be much more careful in their adjustments. While I realize the wisdom of quick settlement of claims where there is a chance of liability, yet I am strongly of the opinion that a united policy of resisting these extravagant claims, which have already been paid by insurance companies, will result in good in the long run.

In regard to one suggestion made by Mr. Stickle, namely, the effort to get the courts to be more liberal in their interpretation of the law as to imputed negligence, I am thankful to say that the Supreme Court of the State of Michigan has so far held to the doctrine that the negligence of the driver is imputable to any volunteer passenger over the age of twenty-one, and quite recently the court has intimated that the negligence of the driver might be imputed to his volunteer passenger, a married woman under the age of twenty-one (vide Granger vs. Farrant, 179 Mich., 19, 20, 34).

Equipment Records on the Erie

IN AN ACCOUNT of the electrification of the thirty-seven-mile branch of the Erie Railroad, in the Genesee Valley, south of Rochester, N. Y., published in the Oct. 9 issue of *Railway Review*, Q. W. Hershey gives some figures for the records of this equipment which are of interest.

Inspection of motor equipment is made every 800 miles, as cars normally come to the inspection house. The cars are operated in regular rotation to obtain a car about every three days. Repairs are ordinarily occasioned on account of burnouts from lightning or overloading, but are very infrequent. The commutators are averaging about 75,000 to 90,000 miles between turnings; gears around 300,000 miles; pinions around 150,000 miles; brushes around 10,000 miles; pantagraph shoes make about 10,000 miles between changes. The change required consists of replacing a plain ⅛-in. galvanized steel shoe without wearing strips. These have a cost at present of about $2.50 each. The pantagraphs are lubricated with "used" gear grease about every 800 miles when the cars come into the inspection shed. The total cost of power and maintenance of equipment, including the maintenance of overhead trolley and structures, averages about 10.4 cents per car-mile.

Providence Section of A. I. E. E. Discusses Automatic Substations

ADDRESSES by G. H. Roosevelt of the Railway and Traction Engineering Department, General Electric Company, and R. J. Wensley of the Switchboard Engineering Division, Westinghouse Electric & Manufacturing Company, were the chief features at a meeting of the Providence (R. I.) section of the American Institute of Electrical Engineers which was held in that city on Oct. 8. Mr. Roosevelt discussed with C. M. Gilt, lighting engineering superintendent General Electric Company, as joint author, "Automatic Systems for Lighting and Railway Service," and Mr. Wensley outlined recent progress in "Industrial Automatic Substations."

E. W. Allen, Chicago office General Electric Company, briefly outlined the history of automatic substation development, paying a tribute to the faith of early purchasers of this class of apparatus. Voltage regulation, the speaker said, is the best measure of excellence of any distributing system. The large amount of feeder capacity required with hand operation is an obstacle to the best distribution service in many cases. In future railroad electrification automatic substations will have to be considered, as they offer some advantages over both the 3,000-volt direct-current and the alternating-current system of operation.

Mr. Wensley stated that his company has recently quoted a central station on an automatically operated high-pressure steam plant with thermostatic control.

A. V. Thompson, San Francisco office General Electric Company, said that the load-limiting feature of the automatic substation is advantageous to traction companies purchasing energy under contracts in which demand is penalized. Motormen find it of little use to attempt to draw power beyond the limit set by good practice as a result of this equipment. Mr. Allen stated that, at a substation of the automatic type near Camp Dodge, trainloads of troops and army supplies were handled by a 300-kw. rotary-converter installation with automatic control, whereas if hand-operated substation equipment had been in service the breakers would have had to be set for 1,000 kw.

A feature of the meeting was a visit to the Rhode Island Company's Oakland substation.* W. C. Slade, superintendent of power Rhode Island Company, Providence, was elected chairman of the section for the coming year.

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*Described in ELECTRIC RAILWAY JOURNAL, Dec. 14, 1918 (page 1038).

Ninth Annual Safety Congress

Electric Railway and Public Utility Sections of the National Safety Council Discuss Enforcement of Safety Measures and Other Topics

THE Ninth Annual Safety Congress of the National Safety Council was held in Milwaukee, Wis., Sept. 27 to Oct. 1. Abstracts of several of the papers have appeared in earlier issues of the ELECTRIC RAILWAY JOURNAL during October. On account of space limitations it has been impracticable to abstract heretofore all of the papers of interest to electric railway men. In the following paragraphs some notes regarding the congress are given, together with abstracts of the remaining papers selected from the large number presented, as of particular timeliness and appropriateness:

R. C. Richards, retiring president, in his opening address, reviewed the progress of the safety movement during the past year and outlined the work for the new year. He said that there are today thirty-seven cities in which local safety councils have been organized to promote the cause of both public and industrial safety in all parts of the country. Sixteen of these local councils in the larger cities have reached the point of activity where they require paid officers who devote their whole time to the work. In his prospectus of the work which lies before the Safety Council, Mr. Richards laid particular stress upon the necessity of combating and mitigating the automobile menace and the importance of educating school children in safety.

In the absence of R. M. Hemming, superintendent of transportation Indiana Service Corporation, Fort Wayne, Ind., chairman of the electric railway section of the council, the two meetings of this section were presided over by John H. Mallon, vice-chairman. Mr. Mallon is assistant general superintendent Chicago Elevated Railways and he was elected chairman of the section for the ensuing year.

More than 3,100 persons were registered at the congress, in addition to 1,400 boys from the Milwaukee schools who attended a special meeting and 1,200 school principals and teachers from Milwaukee who attended another special meeting. There was a gathering of 1,500 Boy Scouts who participated in the demonstration in the arena of the Auditorium.

The result of the election of officers for the coming year was as follows: President, Charles P. Tolman, chief engineer National Lead Company; vice-presidents, W. H. Cameron, L. A. DeBlois, W. E. Worth, John A. Oartel. The following staff officers, with national headquarters at Chicago, were re-elected: C. W. Price, general manager; Sidney J. Williams, secretary; W. H. Frater, treasurer; R. T. Solensten, assistant secretary.

NECESSITY FOR OBSERVING OPERATING RULES

At the electric railway session of the congress on Oct. 1, Hugh Wilson, safety department Northern Ohio Traction & Light Company, Akron, Ohio, impressed on those in attendance the importance of drilling new men on the safety aspect of operating rules. He said that 98 per cent of all accidents are caused by disobedience of rules, or man failure. The operating rules are violated mostly by new men, the disobedience sometimes being caused by ignorance and sometimes by willful negligence. Two remedies for this evil are (1) caution in hiring men and (2) review of the rule book with new men before they are permitted to begin their work on the cars.

Mr. Wilson said that before a man is hired to operate a street car an investigation should be made relative to his home life, his general habits and his former place of work. If he comes from a home where carelessness is a characteristic he will probably be a careless operator. If he is careless in regard to his own affairs he will not be likely to observe rules and work efficiently for some one else. As to his former working place, if his employer there could not depend upon him, he has no place in the electric railway business. The time and money cost involved in such investigation is small compared with that of its lack.

As to going over the rule book, Mr. Wilson said that this brings up the need for a good instructor, a man who has had years of road experience and who is able to impress a new man with the importance of strict observance of rules. Further, the superintendent should take an interest in the new man, to impress upon him the fact that he has been accepted as an important part of the railway family. As an instructor for a year past, Mr. Wilson had been impressed by the fact that it is possible to apply practically the principles which he outlined.

ADVERTISING TO REDUCE ACCIDENTS

In a paper read on Sept. 30 before the electric railway section, Charles B. Hardin, general claim agent United Railways of St. Louis, St. Louis, Mo., took up some of the points which he thought should be considered in planning safety advertising campaigns. After determining the amount of money to be spent, the next thing, he said, is to observe the principle of applying intensive efforts.

Mr. Hardin took up the several ways in which advertising can be done; for example, by the use of paid-for space in newspapers, editorial articles printed on account of the news value of the safety effort and posters and signs carried on cars, mounted on trolley poles, etc., as well as general publicity obtained through clubs, city departments and other organizations. Among other things he said: "The very fact that we are contemplating an advertising campaign should impress the newspapers and other publications favorably. It should show them that we realize the great importance of doing everything possible to reduce the trolley car accidents. While newspapers are somewhat sensitive to 'box office returns'; while they like and probably need the money, they are not moved entirely by mercenary motives. To the average city editor the very fact that the traction company proposes to spend money on a safety campaign is 'news' and will be so treated."

EXHIBIT AS HERETOFORE A GREAT ATTRACTION

As has become the custom in connection with the Safety Congresses, an exhibit of modern safety appliances and practices was held in connection with the Milwaukee congress, this time in the Milwaukee Auditorium. Mr. Price estimates that at least 10,000 persons visited the Auditorium while the congress was in session and that from 5,000 to 6,000 were in the building each day of the week.

An Argentine reader of the ELECTRIC RAILWAY JOURNAL calls attention to a typographical error on page 276 of the issue for Aug. 7. The price paid for energy by the Anglo-Argentine Tramways in 1918 was $0.0783, gold, per kilowatt-hour instead of $0.0183 as printed.

The Electric Locomotive, Pro and Con

At Sectional Meeting of A. S. M. E. and A. I. E. E. Held in New York City on Oct. 22 Experts Discussed the Respective Merits of the Two Types of Motive Power Available for Heavy Traction

A GATHERING which overtaxed the large capacity of the auditorium of the United Engineering Society's Building in New York City was held on Oct. 22 to discuss the respective characteristics of the steam and the electric locomotive with respect to modern transportation conditions. The meeting was the first to be held under the joint auspices of the railroad section of the American Society of Mechanical Engineers, the metropolitan section of the same organization and the New York section of the American Institute of Electrical Engineers. The meeting was well advertised and the enormous attendance indicates the lively interest which is taken by engineers in the subject of heavy electric traction.

The principal papers read were abstracted in the issue of the ELECTRIC RAILWAY JOURNAL for Oct. 23. One of the advantages of the steam locomotive was presented by John E. Muhlfeld, Railway & Industrial Engineers, Inc., while the cause of the electric locomotive was championed by F. H. Shepard and A. H. Armstrong, respectively connected with the Westinghouse Electric & Manufacturing Company and the General Electric Company. The program was presented under the direction of E. B. Katté, chairman of the railroad section of the A. S. M. E.; H. W. Buck, chairman of the New York section of the A. I. E. E., and W. S. Finlay, Jr., chairman of the metropolitan section of the A. S. M. E.

In opening the meeting Mr. Katté said that not only was it the first to be held under the auspices already mentioned, but the occasion was the first on which mechanical and electrical engineers had come together for the discussion of the electrification of steam railroads. It was fitting, he said, that at this meeting attention should be directed to the electric locomotive. He then introduced first Mr. Buck and later Mr. Finlay, who spoke briefly of the importance of the subject and the interest of their respective organizations in it. Next Frank J. Sprague was called upon for introductory remarks, and he responded for the "purpose of 'dressing the window,'" as he expressed it. The chairman referred to him as the "father of electric traction."

Demand for Increased Track Capacity Will Bring Electrification

At the outset Mr. Sprague said that he would not attempt a history of the development of the electric railway, but would refer briefly to some facts incident to his own association with it. He quoted from the *Sun* of a certain day in August, 1887, as follows: "They tried an electric car on Fourth Avenue yesterday. It created an amount of surprise and consternation from Thirty-second to 117th Street that was something like that caused by the first steamboat on the Hudson. Small boys yelled 'dynamite' and 'rats,' and made similarly appropriate remarks until they were hoarse. Newly appointed policemen debated arresting it, but went no further. The car horses which were met on the other track kicked without exception, as was natural, over an invention which threatens to relegate them to a sausage factory." Soon afterward the famous Richmond road, which is fairly called the forerunner of the modern trolley, was equipped, and in three years there were in operation or under construction, here and abroad, something like 350 electric trolley roads, and a quarter of the street tramway mileage of the United States had already been converted to the new power. The reason for this astounding growth was simply that the electric car could do what was impossible to its predecessor.

A result of this success was that wild prophecies were made by imaginative enthusiasts of the coming debacle of the steam railway, so that Mr. Sprague found it necesssary, as the incoming president of the A. I. E. E., in June, 1892, to sound a warning in his inaugural address, cautioning against undue optimism.

MULTIPLE-UNIT IDEA WAS FUNDAMENTAL

Mr. Sprague said further that the solution of the trunk line transportation problem had to be preceded by another and more pressing development which signalized the growth of a new idea, one essential to urban rapid transit, namely, the multiple-unit system. This, now the fundamental of electric rapid transit the world over, for a long time met only with contemptuous regard, despite an existing willingness to put it to a conclusive test on the elevated railroads at his personal risk. Then came the larger developments in the broad field of trunk-line operation for which it has supplied a vital essential.

Looking ahead Mr. Sprague said that he wished again to record his unchanging belief in the coming supremacy of electric power for transportation. This faith was based, not upon a vast disparity between the best which can be built in a steam or electric locomotive, nor upon any overwhelming claims of superior fuel economy when both are dependent upon coal supply, nor upon any material saving in operating expense sufficient to pay the charges incident to the increased capital cost when considered on existing traffic density and methods of operation, but rather upon the broad ground of the overwhelmingly vital demand for increased capacity, a demand which ultimately can be met only by the electric system, because of characteristics individual to it.

He admitted that there are inherent differences between the steam locomotive and its rival. The former is a moving power plant, limited both as to its maximum and its continuous rate of power development by the capacity of its boiler and portable fuel supply. It has, it may be granted, a certain apparent advantage because of its independent entity, but that very independence limits its capacity, not materially in maximum tractive effort, for any locomotive can slip its wheels, but in the amount of energy, that is, the product of speed and drawbar pull, which is possible. The electric locomotive, on the other hand, is but the user and transformer of electric energy created at distant power stations and transmitted to it by stationary conductors, and, thanks to the multiple-unit system, any desired concentration or distribution of power units, under a common control, can be had, and any number of power plants, taking their energy from the centuries-old and diminishing supplies, or the annually renewed frozen white coal of the mountains, may be joined together in common supply.

Mr. Sprague attributed the need for the great concentration of power to the insistent demand for increased capacity. There will come a time when duplication of tracks and increases in bridges, tunnels and terminals and the power of individual units will reach practical limits, when physical facts will rebel against engineering dictum or operative demands, and then the way, and the only way, to meet the demand for increased capacity is by increase of speed, which can only be obtained when unlimited power is at the command of the operator.

Already, said he, the electrification of railway terminals is an essential, suburban service has long been in operation, and through-operation of freight and passenger trains on mountain and other main-line roads satisfactorily negotiated. The same kind of service which characterizes suburban operation can be as readily applied to the longer local runs, such as those between New York and Philadelphia, and one's watch will be the time-table. Where, then, is the limit of the use of electricity? Mr. Sprague fails to see any. All the while the demand for a someday maximum of capacity will persist, as well as the present-day demand for vastly increased expedition in freight movement.

As these demands increase it will become more and more necessary to eliminate as far as possible nonessential rail transportation, and among such will be that coal which can be better burned at or near its source of supply and have its energy transmitted by wire. Unless those responsible for and in control of the country's transportation are sufficiently broad and far seeing to visualize the country's future requirements, and to realize how the welfare of every man, woman and child is bound up in the question of transportation, we shall have a hardening of the arteries and fatal blood clots in the circular system of transportation which will tend toward apoplexy.

In conclusion, Mr. Sprague said that the general electrification of trunk-line railroads is not a matter of immediate possibility of accomplishment. It will only come, as it is coming, progressively and with the accelerating power of example. It will be governed very largely by financial conditions, however justified under a sufficiently enlightened public policy railroads might be, if given sufficient encouragement, to assume the large added burdens incident to electrification. But the test of wisdom of railway officials, financiers and national and state governments is the ability to anticipate and plan against the inevitable before the slowing down and paralysis of traffic, such, for example, as is illustrated by the rapid transit situation in New York City, where congestion affects the daily life and wellbeing of the whole community.

Mr. Sprague referred to a recent article by President Underwood of the Erie Railroad in which the statement is made that the motive power of a railroad represent but 8 per cent of the capital invested, and that the remaining 92 per cent is wholly dependent upon its earning capacity. Considering the business as a manufacturing proposition only, the making and selling of transportation, Mr. Sprague asked, what would be the verdict with regard to any other manufacturing property in which the tool equipment represented but a twelfth of the invested capital. One would naturally suggest an increase of the investment in tools, and so it should be with transportation. There will come the time when the great increase of capacity available because of the use of electricity, plus the fact of its already successful use in many portions of the railway field, will compel the enormous increase in motive power investment inseparable from the adoption of electricity, large as it may prove, a fact which will be justified by the need existing and the results obtainable.

After the reading of the papers by the authors the chairman called in succession upon a number of speakers, each of whom spoke particularly with reference to one or the other type of motive power. In the following report the contributions are grouped, the speakers for the steam locomotive being listed first.

Advantages of the Steam Locomotive

The first advocate of the steam locomotive was F. J. Cole, chief consulting engineer Locomotive Superheater Company, his paper being read by H. B. Oatley, chief engineer of the same company. Mr. Cole said in part: In the twenty-seven years which have elapsed since the first electric locomotive was built for the operation of the tunnel into Baltimore slow progress has been made in this country toward superseding the steam locomotive. In all the papers and reports of the electrical installations we find much about their advantages and much of what has been accomplished, but we search in vain for a complete financial statement showing at what cost in dollars and cents all this is accomplished. Many electrical installations are necessary for special needs such as are mentioned elsewhere in this paper, but it has yet to be proved that there is any great demand for the wholesale electrification of railroads in this country. In the motor trucks and automobiles on the highway, carrying much of the passenger and freight business, we can appreciate something of the value of self-contained, independent power units, which have extreme flexibility and lend themselves readily to some of the transportation needs of this country. While a steam locomotive is limited in its movements to the track on which it runs, yet because it is a self-contained unit it serves well and economically many of our transportation requirements.

In the case of electricity, the entire cost of changing over from steam operation must be taken into account. For electrification it is customary to supply power station capacity in boilers, engines, turbines and generating apparatus largely in excess of the normal demand, located in more than one station so that there may be no interruption in the supply of current. Presumably railroads are now in possession of the necessary appliances for steam operation, and electrification means that much of such equipment must be diverted into other channels or discarded.

The electrification of terminals, tunnels and certain mountain divisions where water power is available is now recognized as desirable installation. Some of this is absolutely necessary, regardless of cost. There may also be a few zones in this country which by reason of density of traffic and co-ordination with the electrified terminals could be changed from steam to electric power with profit and the quicker despatch of business. It is a question, however, whether the best interests of electrical development are served by sweeping generalities and propaganda which has the object of relegating the steam locomotives to the scrap heap, and instilling into the mind of the public how unprofitable, how wasteful and how unsatisfactory is the transportation business when operated by steam locomotives, and recommending as a remedy for some of the ills from which we have been suffering in transportation matters the electrification of the principal roads in this country.

Admittedly, there should be a considerable decrease in fuel consumption for electric operation, but it is doubtful whether it will save anything like the enormous amount which we have recently been told could be saved if all the railroads in this country were electrified. And I think consideration of all the factors entering into the cost of both methods of transportation will show that one is very much exploited at the expense of the other.

> THE gist of the presentation of the steam locomotive side of the electrification question seems to be this: Electrical engineers have been somewhat over-optimistic in their expectation of early replacement of steam by electric locomotives. The latter have been greatly improved of late and they have certain inherent virtues which are highly regarded by operators. Moreover, where is the money for electrification to come from, anyway ?

In the paper read by A. H. Armstrong* in Schenectady, Feb. 20, 1920, it is claimed that 122,500,000 tons of coal can be saved by electrification of railroads. These figures are based on tests which assume that locomotives used 7.86 lb. coal per horsepower-hour, or 10.23 lb. per kilowatt-hour at the driver rims. In regard to two points raised in this paper: (a) Not all of the coal consumed by railroads is used by locomotives. Shops, power stations, passenger and freight depots, offices and sometimes floating equipment have to be supplied; therefore, deduction must be made from the total amount charged to railroad use. Actual figures from one large railroad show that when winter and summer months are considered, 88.6 per cent of the coal consumed is used by locomotives and 11.4 per cent for other purposes. (b) The amount of coal per horsepower-hour of the steam locomotive given in the paper is entirely too high.

Much of the argument is dependent upon the high assumed rate of coal consumption, 7.86 lb. coal per horsepower-hour. For electric locomotives the estimated input required is 40 watt-hours per ton-mile. For coal the estimated amount is 2½ lb. per kilowatt-hour. Now the grand total for all regions (229,057 miles) reported in 1918 for steam locomotives is 190.7 lb. coal, hence the following values per 1,000 gross ton-miles: Electric locomotives 100 lb., steam locomotives 190.7 lb. If all of the engines were new and of modern design, a much better showing could be made. In 1918 the average cost of coal used by locomotives was $3.49 per ton. At 190.7 lb. per 1,000 gross ton-miles the cost of fuel was 33.4 cents per 1,000 gross ton-miles for steam locomotives over the entire United States. On the Virginian Railroad, where the power is comparatively modern, 163.3 lb. coal in 1917 and 160.6 in 1918 was used in steam locomotives per 1,000 gross ton-miles. The cost of fuel for the same railroad in 1917, 1918 and part of 1919 was from 18.7 cents to 25.9 cents per 1,000 gross ton-miles with coal at $2.38 to $2.74 per ton. On the Norfolk & Western for 1918 (five months) and the second quarter of 1919 the cost of fuel was 23.3 cents and 26.6 cents per 1,000 gross ton-miles with coal at $2.51 and $2.65 per ton.

These figures compare very favorably with 28.8 cents for water power given on page 730 of the *General Electric Review*, September, 1920. The cost of electric power for the Baltimore tunnel, 1910 to 1914, was from $1.049 to $1.435, average $1.199 per 1,000 gross ton-miles.

The increasing cost of coal permits the economical use of many fuel-saving devices on locomotives. A few years ago there was not much interest shown in such appliances; therefore, many locomotives are now running which are not so economical as modern engines. A Mallet compound locomotive, if in good condition and using superheated steam, in road tests will average 3.14 lb. dry coal per developed horsepower-hour at moderate speeds mostly on ascending grade. At an average of 3.10 lb. coal per horsepower-hour useful work can be done for 39.5 per cent of the figure given by Mr. Armstrong. Adding standby losses, taken at 17.5 per cent, the consumption is 3.75 lb. coal per developed horsepower-hour. In electrical units this is 5.05 lb. of coal per kilowatt-hour. If a kilowatt-hour can be produced at driver rims for 2½ lb. by electrification and by steam locomotives for 5.05 lb., the total amount of coal required by the roads of the United States if all were electrified will not show the great saving claimed.

The relative merits of steam versus electric locomotives are largely matters of cost. If a correct estimate of energy required to replace a steam engine is taken, in the first instance, it is possible then to estimate with some degree of accuracy the cost of electrification. Then the number of electric locomotives required, the number of power stations, the overhead construction, or third rail, changes in signaling system, shops and appliances to take care of the electric locomotives and power stations and the hundred and one items which go to make up a complete transformation from steam to electrification must be considered. A balance can be struck between the present cost of steam (which is known with a great deal of accuracy) and the computed cost of operation electrically with interest on capital expenditures at the present high rates. After this is done the operating costs can be correctly determined.

There are, admittedly, many attractive characteristics of electric power, but when it comes to a wholesale replacement of steam locomotives, especially on roads not peculiarly adapted to electrification, those responsible for the financial returns to the owners and to the public may well hesitate and ask to be shown the cost, not only of the installation under consideration, but of those now in operation, and the probable return on the investment for the large expenditure they are asked to approve.

After the presentation of the above paper by Mr. Cole the steam railroad standpoint was further explained by A. W. Gibbs, chief mechanical engineer Pennsylvania System. His paper will be abstracted in a later issue of the ELECTRIC RAILWAY JOURNAL.

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*See issue of this paper for Feb. 21, 1920, page 878.

Remarks of Chief of M. P., New York Central

A paper written by F. H. Hardin, chief engineer of motive power and rolling stock New York Central Railroad, was read by R. M. Brown, engineer of motive power of the same road. Mr. Hardin wrote in part:

In comparing the cost of maintenance or operation of electric and steam locomotives it must be remembered that in the steam locomotive a complete power plant must be maintained and operated, whereas in the electric locomotive there is merely the tractor. However, in computing comparative costs, from either the maintenance or the operating standpoint, it seems absolutely necessary to consider the proper proportion of the cost of operating the central power plant in electric service and also the cost of power. One phase of the question is whether the matter of cost is to be based upon existing conditions or the situation fifteen or twenty years hence. The railroad today must pay 7 per cent interest on money, and capital expenditure involved in the construction of power plants, substations and electric transmission lines would be enormous.

Referring to Mr. Armstrong's suggestions as to certain things which the train dispatcher might be able to accomplish with electric locomotives, Mr. Hardin said that if the present steam locomotives could be removed from the rails and replaced with electric locomotives of equal capacity, the question would be how often the electric locomotive could "deliver the goods" at the other end of the line without delay or failure as compared with what the steam locomotive now does. If the electric locomotive can be made to run 1,000 miles without change and without breakdown or diminished power the dispatcher might accomplish a great deal even with present cars, track facilities, etc., but there is more involved than merely replacing a Mikado or Mallet locomotive with an electric locomotive of equal capacity.

MAINTENANCE COSTS NOT UNREASONABLE

As to the statement that there is no need of the back shop for electric locomotives unless turning tires or painting may be considered heavy repairs, Mr. Hardin said that shops will be required, as electric locomotives must be heavy, so that drop pits, cranes and other shop facilities will be needed even for running repairs. Ability quickly to substitute repair parts would be an advantage, but no one can tell how many kinds of parts would be required for the different kinds and types of electric locomotives which would exist after fifteen or twenty years of electric operation. Furthermore, the spare parts or repairs would have to be made in shops maintained either by the railroad or outside concerns. As to the quoted maintenance cost of 60 cents per mile for a steam Mallet as compared with 14.65 cents for the St. Paul electric, costs on a New York Central division which used Mallets for most of its heavy freight trains in 1918 and 1919 amounted to from 21 cents to 25 cents per mile. These figures included some simple locomotives in operation on the same division. Some further figures covering back shop repairs of Mallet locomotives on two different divisions for the year 1919 showed averages from 12 to 19 cents per mile. Engine house maintenance cost is not readily obtainable, but may be assumed at not more than the shop cost per mile. Therefore, the total cost for the Mallet locomotive, including shop and engine house repairs, would be from 24 cents to 37 cents per mile.

Referring to costs, Mr. Hardin said that electric locomotives had been stated to cost possibly 50 per cent more than steam for equal driver weight, etc. In 1917 five modern 4-8-2-type freight locomotives cost about $205,000, about the same as one St. Paul electric locomotive. The five steam locomotives had total maximum tractive effort of about 250,000 lb., whereas the one electric had only 115,000 lb.

Taking up some points in Mr. Shepard's paper he said that the solution of the railroad problem lies in obtaining the money to build, more than electrification or any other factor. As to present standards of train make-up, classification and terminal handling, as to which Mr. Shepard thought that electrification would double the capacity of any railroad and, as methods are improved, double it again, he felt that electrification is only one factor in the solution of the problem and perhaps not the greatest one involved in accomplishing what Mr. Shepard sees in the future. As to the practicability of greatly increasing the speed of freight trains almost to that of superior trains, this undoubtedly means that improvements in freight car design must be made.

Mr. Hardin concluded by reference to Mr. Armstrong's statement that the Mikado locomotive burns 158 lb. of coal per 1,000 ton-miles. Some recent figures on one of the New York Central principal main-line divisions show a fuel consumption varying from 125 to 130 lb. per 1,000 gross ton-miles in freight service. In passenger service the consumption is from 12 to 17 lb. per passenger car-mile.

Coal Consumption on Steam Locomotives

In the absence of W. F. Kiesel, Jr., mechanical engineer Pennsylvania Railroad, some comment which he had prepared was read by title. His contribution in abstract follows:

Mr. Shepard expresses his belief that electrification is bound to be the most potent factor in the relief of the transportation problem. For electric locomotives he claims greater power, speed, flexibility and mobility; intimates that under electric operation divisions can be made much longer, and electric locomotives can be built to take any train which will hold together over any profile, at any desired speed, limited only by condition of track and car equipment. The same claim can truthfully be made for the steam locomotive.

For either kind of operation the length of divisions and location of terminals are governed by other than locomotive limitations, or, at least, there is no valid reason why any features of either electric or steam locomotives should affect the location of, or distance between, terminals.

In power, speed, flexibility and mobility either type can furnish all that track and car equipment will permit. To illustrate this, attention is directed to three recent locomotives: One was built by the General Electric Company, for the Chicago, Milwaukee & St. Paul Railway. According to a General Electric Bulletin* it has a starting drawbar pull of 115,000 lb., and a drawbar pull of 56,500 lb. at 25 m.p.h. on a 2 per cent grade. The two others were built by the Pennsylvania System. One is an electric locomotive having two synchronous speeds (10 and 20 m.p.h.), and the other a steam locomotive with four simple cylinders.

Both Pennsylvania locomotives have a drawbar pull, in starting on level tangent, of 135,000 lb. On grade the effect of truck and tender weight of the steam locomotive shows its influence, and the net drawbar pull, at 20 m.p.h. at rear drawbar (calculated) of these locomotives is as follows:

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*No. 44,102.

	Electric	Steam
On level, lb.	81,000	83,375
½ per cent grade, lb.	78,000	80,250
1 per cent grade, lb.	76,000	77,125
1½ per cent grade, lb.	73,500	74,000
2 per cent grade, lb.	71,000	70,875

Furthermore, the steam locomotive can deliver more net drawbar pull than the Milwaukee electric locomotive at any speed up to 50 m.p.h., and on any grade that it would have to encounter.

The strongest coupler in use today (American Railroad Association Type "D") has an elastic limit of about 200,000 lb. On present equipment there are several million couplers of a strength inferior to this. Therefore, it would scarcely be advisable to build locomotives of greater pulling capacity than two-thirds of the elastic limit of the strongest coupler, or 135,000 lb.

Mr. Shepard mentions retirement of weaker car equipments, which no doubt is advisable but will require time. His sentence, "Every other industry that has been electrified has experienced a revolution in methods and service, due to electrification," invites the most careful thought of those contemplating a change in operation.

Will electric service produce greater returns? Can the revolution in methods and service be accomplished without serious handicap during the transition period?

The capital investment for electric service will be more than five times as much as for steam service. The cost of an electric locomotive is about twice as much as that of a steam locomotive of the same power. The electric locomotives have shown some saving in repairs over steam locomotives, but after ten or twelve years' service they require rebuilding, especially in the electrical equipment, which runs the total cost of repairs beyond that of the steam locomotives. Possibly this can be improved.

From the report of the commission which investigated the advisability of substituting electricity for steam, in Chicago, it appears that the maintenance cost for wages and material would be 30 per cent more for electric operation than for steam. This is offset, at least partially, by electric traction advantages of regeneration, no reforking of ballast to remove smokestack cinders, less wheel and brakeshoe wear, etc.

With the exception of three factors, capital investment, coal per drawbar-horsepower and standby losses, there is too little difference between the two, for operation in open country, for further consideration.

Mr. Shepard speaks of one locomotive as a generator of power, and the other as a transformer of power coming from central stations with many refinements and high thermal efficiency. He credits the best steam locomotive with an average coal consumption of twice that of electric operation, for the same work performed.

FINE COAL CONSUMPTION RECORD ON PENNSYLVANIA

The Pennsylvania System steam locomotive referred to has the same steam distribution system as that of a 2-10-0 locomotive, which has been fully tested on the locomotive test plant* and will burn no more coal per drawbar-horsepower. The average coal consumption per drawbar-horsepower of the locomotive tested on the plant was 2.7 lb. for all firing rates up to 100 lb. per square foot of grate per hour and 3.27 lb. for all firing rates from 100 lb. to 160 lb. per square foot of grate per hour. Locomotives seldom have to burn more than 100 lb. per square foot of grate per hour. These steam locomotives had no feed-water heaters, the use of which, as proved by other tests, would reduce the amount of coal per drawbar-horsepower appreciably.

Inquiries were sent to various electrified roads, not including those with only short transmission terminal operation, requesting the average cost in coal per kilowatt-hour at the power plant, the average efficiency of the transmission line from power plant to the locomotive and the average efficiency of the locomotive.

One road, which has been electrically operated a number of years, and records each month's operation, has a power-plant "cost" of coal per kilowatt-hour of 2⅝ lb. as the minimum when the plant output is maximum. Taking this as 100 per cent load factor, the cost is per kilowatt-hour 3.2 lb. of coal for a load factor of 50 per cent, and 3.53 lb. for a load factor of 40 per cent. Most of the monthly record figures lie between 35 and 50 per cent load factors, and the average of coal per kilowatt-hour is above 3½ lb. These figures necessarily reflect both the daily and monthly variations in load factor, and are, therefore, high.

Another road reports 40,000 to 44,000 B.t.u. per kilowatt-hour at switchboard for coal varying between 13,000 and 14,200 B.t.u. per pound.

MR. BEEUWKES QUOTED

The coal used in the test of the 2-10-0 steam locomotive given above averaged 13,429 B.t.u. per pound.

Replies as to the line efficiency appeared inconsistent, therefore the data given by Reinier Beeuwkes in his paper before the Pacific Coast section, A. I. E. E.,* are cited. These show an average ratio of net input at locomotive to actual system input for locomotive of 66.3 per cent for the Missouri division, and of 68.3 per cent for the Rocky Mountain division. Replies as to locomotive efficiency indicate that this is less than 75 per cent in all cases.

Apparently the fluctuations in load factor present a greater menace to coal economy than steam locomotive standby losses. The average load factor may be taken at 50 per cent. Neither line efficiency nor locomotive efficiency is likely to average as high as 75 per cent.

Existing installations may be taken as approaching, but not yet reaching, 3 lb. of 13,500-B.t.u. coal per kilowatt-hour at the power plant, a line efficiency of 75 per cent and a locomotive efficiency of 75 per cent, resulting in a consumption of 4 lb. of coal per drawbar-horsepower-hour. Therefore, the standby and other losses of the steam locomotive can be 32.5 per cent to equal the probable best average performance of present-day electric traction in coal consumption, and that much loss would be a sorry reflection on operating methods.

Possibly improvements may change this situation, but until the electric locomotive is ready to do the work as cheaply as the steam locomotive it is illogical to tear up the old operation by the roots and substitute a much more costly plant whose habits are not so well known.

Mr. Armstrong also dwells on greater power, speed, flexibility and efficiency, and speaks of running a thousand miles with no attention, except by crews. He describes ideal characteristics of a locomotive, none of which apply to the electric locomotive in any greater measure than to the steam locomotive. The "precedent and prejudice" to which he refers seem to be imaginary. As he uncovers step after step of his flights of imagination a gradually increasing desire for "facts" is felt.

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*See Pennsylvania System Test Bulletin 31.

*See ELECTRIC RAILWAY JOURNAL, July 31, 1920, p. 227.

In view of existing locomotives described in the foregoing, the table of comparisons between two steam locomotives, a Mikado at 14 m.p.h. and a Mallet at 9 m.p.h. (evidently not good specimens) and an imaginary electric locomotive at 16 m.p.h., is, to say the least, inconsistent, and the claim that a mountain division will have an increase of 50 per cent in daily tonnage over possible steam engine performance is not so "modest" as claimed.

In this statement the claim that "electric locomotives can be maintained for 20 to 25 per cent of the upkeep cost of steam locomotives" should be included.

Two statements in the fuel comparison deserve some analysis. The standby losses for steam locomotive are given as 9,042 lb. of coal. The regenerative braking on the electric locomotive is credited with a saving of 1,430 lb. of coal. About half, or 4,595 lb. of coal, of the standby losses are for making fire and drifting, which is high. The coal used for making fire is not all loss.

As to regeneration returning 18 per cent of current used back into the line, that appears high, and leads to the suspicion that Mr. Armstrong uses a comparison between a very bad steam operating condition and a very good electric operating condition, which is not representative of averages.

At present steam locomotive standby losses are high, but when railroads get back to normal these losses will be materially reduced, and the average will no doubt be less than 15 per cent of the coal used. Regeneration may be a slight factor, but it will be nearly negligible in averages.

ELECTRIFICATION SOMETIMES HAS PRIORITY RIGHTS

For certain local conditions electric traction should be given priority rights, even if the cost is greater. They are: (1) In tunnel operation; (2) in large cities and their suburbs; (3) where sufficient water power is available; (4) where super-power plants can be built in juxtaposition to an adequate supply of culm, or other low-grade combustible not easily marketable.

In the open country, where smoke and gases from the stack are not seriously objectionable, existing installations do not yet indicate that electric traction can be carried on with as little coal consumption as modernized steam traction. Where steam locomotives are too small and inefficient, larger and more economical steam locomotive units to meet any power and speed requirements within the limitation of track and equipment can be substituted without in any way interfering with the continuity of traffic or educating the personnel to handle the new power. As tersely stated by Mr. Shepard, the substitution of electric traction will require a revolution in methods and service.

The answer to the problem is governed by whether there is a saving in coal with electric traction over that with steam traction, including standby losses, and whether this saving is sufficient to pay interest, depreciation, taxes, insurance, etc., on more than 400 per cent greater capital investment, and for the interruption of traffic and the revolutionizing of the organization during the transition period.

Maintenance of Electric Locomotives Affected by Overload

The fifth speaker for the steam locomotive was W. L. Bean, assistant general mechanical superintendent New Haven Railroad. Mr. Bean declared that while, broadly speaking, electrical operation requires less coal per unit of traffic handled than steam operation and the mileage per unit of electric equipment is ordinarily greater per unit of time, yet on one road the first cost of the electric engines per unit of capacity was 84 per cent greater than in the case of steam. Referring to the comparative flexibility of the two types he said that a certain modern passenger electric locomotive will handle a heavy train of Pullmans at high speed on a through run with few stops such as would require a modern Pacific type steam engine of about 43,000 lb. tractive effort, but because of heating caused by frequent starting in heavy local service, the maximum train which could be handled by the same electric locomotive is one which could be hauled by a steam engine of about 30,000 lb. tractive effort. There is also not much elaboration of the fact that an inconsiderate or overambitious yardmaster may overload the electric engine, and that machine, possibly in sympathetic endeavor to live up to the expectations of its sponsors, goes after its job like a spirited horse. A steam locomotive, on the other hand, being what might be termed more phlegmatic, will do about so much and no more, and either stalls or loafs over the road without injury to itself. The electric engine may not be subject to "creeping paralysis," but since it leads a strenuous life, it acquires a sort of hardening of the arteries in the way of accumulative depreciation of insulation which leads the way to heavy repairs.

Again, it is difficult to understand how railroads are to maintain electric locomotives without back shops, unless they job the work out to manufacturers of electrical equipment. Bearings wear, springs fail, axles and frames break on electrics as much as they do on steam engines. Switch groups, transformers, motors, both main and auxiliary, air compressors, blowers, control and collector apparatus, all require overhauling periodically. Officers in charge of maintenance of electrical equipment on one Eastern road are at present insisting that $350,000 be expended soon for an addition to the present back shop.

While the design of a steam locomotive is said to be utterly circumscribed by the necessity for tying it up to a steam boiler, the statement can also be made that some modern high-powered electric locomotives are so compact with apparatus, both inside the cabs and beneath, as well as on top, that additions to, or enlargements of details, even of a minor nature, are well-nigh impossible. When one comes to the problem of heating passenger trains, electrically drawn, the difficulty of finding room for the boiler, water and fuel oil storage, auxiliaries, etc., and keep within weight limitations, lead one to the conclusion that on electric passenger locomotives the boiler is circumscribed by electrical apparatus. Electrical engineers on one road have even advocated the construction of a tender for carrying the boiler, water tanks, etc. Imagine an electric locomotive requiring a tender!

The steam locomotive, except in a moderate way as to clearance and weight limits, has a wide range of application. Railroads loan steam power back and forth with advantage usually to both parties, but no case comes to mind where electrical equipment for heavy traction can be interchanged. It is to be hoped that the lines of development of electrical facilities will tend to converge along lines of common usage rather than diverge too widely. Some reasons for such desirability are: (a) Railroad managements will not be so fearful of becoming tied up with a heavy and inflexible type of investment, which may quickly become obsolete through not lending itself reasonably well to extension of modernization, and (b) the need for a broader field of design and manufacture of equipment and the furnishing of repair parts for the same.

Dependence largely on one manufacturing concern which must unload heavy overhead charges at surcharge rates, unheard of in the case of steam locomotives, is highly undesirable and is restrictive to the extension of electrification.

Virtues of the Electric Locomotive Extolled

The first speaker to reinforce the arguments of Messrs. Shepard and Armstrong in favor of the electric locomotive was C. H. Quinn, chief electrical engineer Norfolk & Western Railway. He said that if we are to maintain our standing in the commercial world our railroad facilities must go forward. Obviously the movement of freight traffic takes precedence over other transportation problems, hence interest and study should be concentrated on the freight locomotive. The following extracts indicate Mr. Quinn's line of thought:

If our knowledge of the development of freight car equipment is indicative of what our freight transportation motive power needs may be in the future, we should begin to look into the possibility of the steam locomotive being able to keep up with development of other transportation facilities. Freight cars for carrying coal within the past ten years have been increased in capacity from 50 to 100 tons per car for 100 per cent. Apparently the steam locomotive may be called upon indefinitely to meet the ever-growing demand for heavier trains which must be operated at higher speed and with minimum delay between terminals. During this same period the largest type of steam locomotive has added generally about 13 per cent to its weight and number of driving wheels. In 1909 the Mallet engine had up to a total weight of 700,000 lb., with 412,000 lb. on driving wheels (Santa Fé 2-8-8-2). In 1919 the engine of the same type had a total weight of 731,000 lb., with 478,000 lb. on driving axles. With the exception of a special design only permissible in restricted track districts these are characteristic figures for the representative steam locomotive development during this period. With vertical and side clearance limited to fixed values the engine can only be enlarged by adding to its length. Again the rigid wheelbase stops the expansion along the track.

Reference has been made to similarity in capacity of the 2-10-10-2 Mallet locomotive on the Virginian Railway and the electric freight locomotive on the Milwaukee. However, it was only by reason of the extremely wide side clearance existing on this one road that such an engine could be used. Furthermore, the engine could not be handled by its own power over any railroad but had to move over a special route from factory to point of delivery. If we are to provide for the use of these larger steam engines on all railroads the cost of bridge and tunnel work and possibly the rearrangement of clearances on some double-track railroads must be given consideration and the cost charged against the future increase in capacity of the steam locomotive.

Again, in the improvement in fuel economy in the steam locomotive for the past ten years we find that relatively little has been done to keep pace with the ever-increasing demand for fuel conservation.

The American Locomotive Company in 1911 issued a bulletin giving in detail the results of six dynamometer-car tests, made behind a 0-8-8-0 Mallet engine. This locomotive had a total weight of 523,500 lb., with 376,800 lb. on drivers. It operated on saturated steam and was hand-fired.

This particular engine, under special supervision of the testing crew, as an average of six tests delivered a drawbar-horsepower hour on 5.15 lb. of coal fired. In 1918 under similar operating conditions a practically new 2-8-8-2 Mallet engine, weighing 695,000 lb., with 472,000 lb. on the driving wheels, and equipped with superheaters, brick arch and stokers, as an average of six tests gave a drawbar-horsepower-hour on 4.33 lb. of coal.

30 PER CENT OF COAL SAVED ON N. & W.

The above figure of 4.33 lb. of coal may be compared with the performance of the electric locomotive on the Norfolk & Western, the operating conditions being very similar. Converted into electrical terms this is 5.77 lb. per kilowatt-hour at the drawbar. Adding to this 23 per cent, a nominal amount for standby losses, we have a total of 7.12 lb. During 1919 our Bluestone plant generated for traction purposes about 67,395,000 kw.-hr. and burned 103,034 tons of coal, which is equivalent to about 3 lb. of coal per kilowatt-hour at the switchboard. As a total loss between busbar and drawbar of 40 per cent is an average for electric locomotives of the size and weight of those on the Norfolk & Western the coal consumption is 5 lb. per drawbar kilowatt-hour, a saving of 2.12 lb., or 29.3 per cent in favor of the electric locomotive. During this twelve-month period we handled 4,714 eastbound trains and burned 103,034 tons of coal, or slightly under 22 tons per train. An average of three tests with hand-fired Mallet engines in the same service and using a sacked coal showed a total consumption per train of 35 tons, or an excess for the steam engine of 13 tons per train over the electric locomotive.

The suggestion has been made here this evening that we consider from twenty-five to fifty years as the useful life of a steam locomotive and that the steam locomotive designer and builder become active in the direction of superheating and compounding of steam locomotives for the purpose of increasing their capacity. Might we ask what has become of the four-cylinder and cross-compound engines of thirty years ago and likewise of the experience gained with compound engines during this period? If the benefits derived from compounding are not thoroughly understood after thirty years of experience how can we expect the next twenty-five years to develop such data as will materially improve the situation. It required fifty years to settle upon 4 ft. 8½ in. as the standard track gage. It is inconsistent to attack the electric locomotive because after a limited trial of fifteen years we still have two systems of power distribution in use.

Reference is made to the handling of heavy tonnage trains as reflecting in peak loads on power plants and the transmission system. On the Norfolk & Western we handle our entire electric operation without any instructions from train dispatchers and without any system of arbitrary train spacing. Our power plant and transmission system are fully able to take care of 100 per cent more tonnage in a given time than had ever been handled by steam power. The prospective user of the electric locomotive need not fear any failure or limitation from this source if the installation is laid out with the present degree of latitude in providing general facilities over the right of way and at terminals for steam power.

The electric locomotive is charged with imposing definite spread of traffic over a division, the inference being that this is necessary for economical and successful operation. In this connection I may say that the automatic block signals on the Norfolk & Western are the only devices used to guarantee a spread traffic in our electric zone, and so far they have been very successful.

Further reference is made to some uncertainty in the functioning of the regenerative control of the electric locomotive. Like all other systems of braking, the regenerative system is susceptible to man failure. On the Norfolk & Western we are moving in one direction an average of 4,000 trains per year. We have had the electric locomotives in service about five years and in that time have handled more than 20,000 trains, using only the regenerative apparatus to brake a 3,250-ton train down a 2.3 per cent grade.

So far we have not had a man failure and the regeneration still has 100 per cent operation to its credit.

If our freight-car carrying capacity can be increased 100 per cent in ten years are we to be satisfied in considering the freight locomotive as having reached its maximum development? Is the railroad operating world as a whole going to be satisfied with the freight revenue obtained by using 100 per cent larger cars and be forced to reduce the number of cars per train by the limitation of the steam locomotive? Do we expect our operating officials to be satisfied with the continued payment of premium overtime for freight train crews brought about by the slow movement of trains and the eight-hour day? The average engine and train crew is held 25 per cent of its time at terminals. If we are to eliminate the ever-growing labor expense of premium overtime and reduce the standby losses of our locomotives running time per 100 miles must be reduced to five hours instead of eight, now about the best we can expect from the steam locomotive.

If we are to aproach this problem with the purpose of providing such motive power at the head end of our freight trains as will develop not only the drawbar pull up to the maximum capacity of the heaviest gear now in use but such an engine as will sustain this pull at a speed that will permit train operation over a 100-mile division of varying profile within the time limit of the eight-hour day we fail to find a steam locomotive record that will answer this specification.

Following Mr. Quinn, the case for the electric locomotive was carried further by A. L. Ralston, mechanical superintendent New Haven Railroad. His paper will be abstracted in a later issue.

Mr. Beeuwkes Sends a Contribution

The Milwaukee Railway was represented in the discussion through a communication sent by Reinier Beeuwkes, electrical engineer of that road. Mr. Beeuwkes' paper, which was read by title, is abstracted below:

Mr. Beeuwkes said that as frequent references were made in the papers to the Chicago, Milwaukee & St. Paul electrification, he wished to correct mistaken impressions which might be derived from such references in Mr. Muhlfeld's paper. He quoted Mr. Muhlfeld's statement to the effect that "few if any existing steam roads can justify or stand the additional capital expenditure per mile of road for electrification, etc." The statement, he said, is supported by neither facts nor figures. It is not borne out in the case of the St. Paul electrification, and there are many roads with like conditions which might expect results similar to those which the St. Paul has obtained. The electrical operating experience of this road enables accurate determination to be made of what the results of electrification will be in any similar case, and there are few cases which will not profitably warrant at least consideration of electrification. In any event actual available operating data will permit of settling the matter one way or the other in the individual case. That Mr. Muhlfeld's opinion does not represent the foregone conclusion of steam men in general is evidenced by the serious attention they have more and more been giving the matter of electrification.

Mr. Beeuwkes also referred to the comparison made between a St. Paul electric articulated and a Virginian steam articulated locomotive. In this the assumption seems to be that the electric locomotive had been designed to secure the maximum capacity possible, and the purpose of the comparison seems to be to show that the steam locomotive can be built with still greater capacity. The St. Paul locomotive, he said, was actually designed for capacity sufficient to handle a 2,500-ton trailing load over any portion of the profile without helper on grades of 1 per cent or less, at a speed of approximately 16 m.p.h. It was designed for no greater capacity, because that specified was deemed by the railway to be sufficient. The tractive effort of this locomotive at 15 m.p.h. is about 88,000 lb. instead of 71,000 lb. as given in the tabulation. The figure of 71,000 lb. represents approximately the continuous tractive capacity, and the speed corresponding would be approximately 16 m.p.h.

The item of train speeds is important to consider in connection with the many cases in which the question of terminal capacity does not enter, but rather that of increasing existing track capacity or, in lieu thereof, providing additional tracks. While it might be practicable to secure any desired speed at any tractive effort in an electric locomotive, provided the necessary resistance were supplied, actual practice has demonstrated that ample flexibility is secured by providing two or three running speeds for any particular tractive effort. There was no particular difficulty involved, however, in securing as many as nine running speeds in the case of one of the new types of St. Paul passenger locomotives.

In connection with the comparison between a Pacific steam locomotive and the St. Paul passenger locomotive, Mr. Beeuwkes stated the facts to be: That the electric locomotive is designed to handle, and tests have shown it capable of handling, a trailing load of not less than 960 tons over the profile, including the 2.2 per cent grade at the Columbia River. This is equivalent on the average to a train made up of thirteen of the St. Paul steel cars, or of fourteen cars of the average weight of the cars in the train mentioned by Mr. Muhlfeld.

Referring to Mr. Muhlfeld's comments on fuel consumption, Mr. Beeuwkes said that fuel economy does not constitute the principal claim for electrification. This depends, in the individual case, upon the relative cost of delivering coal or electricity to the locomotive after all fixed and operating charges are considered. It may for such individual case develop that the savings from electrification will be those due to decreased cost of engine repairs, engine house expense, train and enginemen's wages, increased ton-mile capacity of locomotives, etc. In the case of the St. Paul the power contracts apply for 100-year terms, and a fixed price for energy is thus assured. The figure of 40 kw.-hr. per 1,000 ton-miles used by Mr. Armstrong represents an average for the whole year for trains of varying tonnages and under all weather and other affecting conditions. A corresponding figure based on special test runs as derived by Mr. Muhlfeld would obviously not be comparable. The comparable fuel figure for all trains and for the whole year for the district to which Mr. Muhlfeld refers could hardly be expected to run very high, as the average grade between the points mentioned is only about 0.06 per cent and the ruling grade only 0.8 per cent, as compared with the mountain grade conditions on the St. Paul. Mr. Beeuwkes also took up the reference made to the steam equipment which was replaced by the electric locomotives. This was stated to be antiquated or obsolete. The line of the St. Paul west of Mobridge has only been in operation since 1908 and most of the locomotives for it were purchased new. While most of the new locomotives were not of the most improved present-day type, they are probably representative of what is in general use by other roads.

THE proponents of the electric locomotive contended that fuel economy does result from its use. But the greatest boon conferred by electrification is increase in track capacity. This results from the possibility of obtaining higher speed and greater tonnage per train. Regenerative braking also is a unique contribution to the art of railroading. Railroads which have electrified sections appear to be enthusiastic as to the future of electrification.

The list in Table I shows the types in operation on the Rocky Mountain Division in December, 1915 (excluding locomotives in shop), just before electrification. The coal per 1,000 ton-miles for October, November and December, 1915, averaged for freight service 276 lb. as against 39.4 kw.-hr. per 1,000 ton-miles for October, November and December, 1916, under electrical operation.*

TABLE I—C., M. & ST. P. STEAM LOCOMOTIVES IN FREIGHT SERVICE, ROCKY MOUNTAIN DIVISION

Number	Class	Weight on Drivers, Pounds	Rated Tractive Power, Pounds	Remarks
		Road Engines		
7	Prairie	152,000	33,300	Simple
3	Mikado	216,500	50,600	Simple, superheater
12	Mikado	201,000	46,630	Simple
7	Mallet	327,500	76,200	Comp., superheater
5	Mallet	323,500	76,200	Compound
		Helper Engines		
1	Mikado	213,500	50,000	Simple, superheater
2	Mikado	205,000	46,630	Simple
2	Mallet	323,500	76,200	Compound

Taking up the item of efficiency of locomotive operation, Mr. Beeuwkes said that allowance for transmission losses between power plant and railroad electric system depends on the conditions of the particular case, provided that the station coal consumption, in this case 2.5 lb. per kilowatt-hour, is not already sufficient to cover the transmission loss. If the power plant is located on the railroad adjacent to the railway transmission system, no additional loss allowance is necessary. If the plant is not so located a maximum allowance of 10 per cent of the power delivered would cover the transmission loss, even for a considerable distance, without expensive transmission construction. He also said that comment is superfluous regarding such indefinite remarks as: "When, on account of transportation conditions, a motor is required to carry an overload for periods of five or six hours it either breaks down due to heating, etc." An electric motor can exert abnormal tractive effort for considerable periods without injury, whereas the steam locomotive has a well-defined maximum tractive capacity, depending upon the steam pressure at which it is supplied.

By way of summary of Mr. Beeuwkes' comment on several other points in Mr. Muhlfeld's paper, the following points are of interest: (1) One of the marked economies effected by electrification is the reduction of train and enginemen's expense, on account of the increased ton-miles per train-mile and per engine-mile, and the reduction of equipment repair and roundhouse expense. (2) The spacing of trains to hold down the power demand on the St. Paul electrification has in combination with the action of the power-indicating and limiting system worked out very well. When the load factor was running 60 per cent or higher the automatic slowing up of trains involved an increased expenditure for freight train and enginemen's time of about 10 per cent. With a load factor of from 50 to 55 per cent, however, the limiting action takes place through only a small part of the day, and while there is a considerable reduction in the maximum demand there is little effect on the operation. (3) As to ease of starting trains, this feature of electrical operation is noticeable, conducing to increased comfort of passengers, an electrical operation asset whose value is not always recognized. As to starting each car successively, this does not apply in the case of a train on a mountain grade. (4) The performance, described by Mr. Muhlfeld, of a heavy steam freight train going down a 17-mile grade averaging 2.2 per cent, without stop to cool brakes, is unusual. His information as to the accident on the St. Paul is incorrect. There is nothing in the regeneration system which prevents the application of the air brake at any time, and if they are applied soon enough and properly, and are in good condition, the train will stop. At an investigation of the accident, testimony was introduced by some of the crews to indicate that the brakes were not in proper condition, but it was admitted that the brakes were tested before the train was started down the grade and the brake-inspection crew testified that the number of good brakes per car was above the requirement. The speed-recorder tape was not operating, so direct knowledge of the speed at which regeneration was attempted was not available. In any event the overload relay or overvoltage relay on the locomotive operated and disconnected the motors from the line, and the engineer, whatever the reason, failed to bring the train to a stop by means of his air brake. The enginemen, trainmen and others connected with the electrical operation were unanimous in declaring that the accident was in no way an electrical failure. The electric locomotive in this case attained a maximum speed of about 50 m.p.h. and at this speed passed round a sharp curve at the foot of the grade without leaving the track or damaging it in any way. (6) Frequent references are made in the paper to improvements which are being or can be made in steam locomotives and steam operation which will make the average steam locomotive compare favorably in its performance with the electric locomotive. Steam locomotives have been used for a great many years and the electric locomotive is comparatively new. It is not too much to expect that the electric locomotive and electrical operation will also be progressing while the steam locomotive and steam operation are trying to catch up.

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*See issue of this paper for March 24, 1917, page 541.

Mr. Katte Sums Up the Case for the Electric Locomotive

The chairman had prepared some comment for the close of the discussion, but owing to the lateness of the hour he omitted the reading of his notes. These were of a conservative tenor. The conservative engineer, he wrote, on considering the papers prepared for the meeting, would be apt to conclude that too much has been claimed for the steam locomotive as well as for the locomotive operated by electricity. Without doubt there are advantages peculiar to each, but it will always rest with the railroad engineer to determine and decide which type of locomotive will be best suited to the peculiar conditions surrounding the railroad which he serves.

Because of the different operating characteristics of steam and electric service it may be misleading to compare the time the locomotives are in use. For example, the electric locomotives of the New York Central Railroad operate only in a terminal zone, which makes the comparison with locomotives on steam-operated divisions hardly a direct one. However, the following comparison of per cent of "time ready for service," compiled from actual records for the first eight months of this year, will be of interest:

READINESS OF LOCOMOTIVES FOR SERVICE

Condition of Locomotive	Electric Locomotive	Steam. Locomotive
Ready for service, waiting, per cent	56.2	24.3
In service, per cent	31.3	47.8
At terminals, per cent	4.0	4.6
At engine house, per cent	8.5	23.3
	100	100

The fact that the electric locomotives stood waiting for service 56 per cent of the time and were actually in use only 31 per cent of the time is due to the train schedule and the grouping of a large number of trains night and morning with comparative inactivity between these hours. This clearly illustrates the necessity of carefully studying local conditions before coming to the conclusion that electric operation will prove more economical than steam operation for a given railroad proposition.

Unfortunately, a direct comparison, applicable for all railroads, between the coal burned on the steam locomotive and the fuel consumed in the power house for supplying energy to the electric locomotive cannot be made with the same accuracy as, say, between a reciprocating engine and a steam turbine. This is because there are not a representative steam division and an electric division operated under anything like the same conditions. The following comparison of fuel consumption has been computed from the reasonably accurate records of three railroads operating both steam and electric locomotives under widely different conditions both as to equipment and service:

COMPARATIVE FUEL CONSUMPTION—STEAM AND ELECTRIC.

Items	C., M. & St. P. R. R.	N. & W. R. R.	N. Y. C R. R.
Kilowatt-hours per train-mile measured at alternating-current side of substation	29.1	361.	34.5
Pounds of coal burned on steam locomotive per train-mile	188.	1400.	112
Pounds of coal on steam locomotive equivalent to 1 kilowatt-hour measured at alternating current side of substation	6.46	3.88	3.25
Computed pounds coal at power station per kilowatt-hour referred to alternating current side of substation	2.44	2.44	2.44
Saving of coal in favor of the electric locomotive, per cent	62	37	25

This wide range of results and the apparent discrepancy in the relative fuel consumption are due to widely different conditions. Even a wider difference in power consumption will be found on trains in different service on the same division, as, for instance, on the New York Central Railroad, a multiple-unit train making stops every mile or so will consume 150 watt-hours per ton-mile, whereas the through trains making no intermediate stops in thirty miles or more will consume but twenty-six watt-hours per ton-mile.

Finally, too much reliance should not be placed on results obtained from test runs, even if they fairly well simulate actual conditions. To be of comparative value, service records should extend over several years, and the data should be carefully collected, correlated and averaged to give results that may be expected in everyday operation.

CLOSING REMARKS BY GEORGE GIBBS

The discussion of the evening was closed by George Gibbs, chief engineer electric traction Long Island Railroad. Mr. Gibbs spoke as a railroad man. He said that in discussing this subject it is presumably permissible to view it from the standpoint of either design or performance. It concerns the relative advantages of two kinds of power plants for conducting railway transportation. An abstract of Mr. Gibbs' remarks will appear in a later issue.

Electrolysis Committee Active

THE research sub-committee of the American Committee on Electrolysis is making an important series of investigations in Cleveland, with the financial support of the Cleveland Railway and the Cleveland Electric Illuminating Company. L. P. Crecelius, superintendent of power of the railway and American Electric Railway Association representative on the research sub-committee of the A. C. E., has been active in this work. Pipe drainage as a means for electrolysis prevention is being particularly studied, and the first work includes new installation. Problems of interchange of current between conductors, of joint electrolysis, etc., are being considered in connection with gas and water piping and power and railway cables.

PUBLICITY

HOW WHEN WHY

Further Suggestions as to Movies

SOME suggestions regarding the use of movies were printed in last week's issue of this paper, and the following additional communications are given to indicate the continued interest in this subject as a practical means of railway publicity.

Motion Pictures Can Be Used if Film Is Prepared by Experts

TOLEDO RAILWAYS & LIGHT COMPANY
TOLEDO, OHIO, Sept. 30, 1920.

To the Editors:

I have read with much interest the articles in the Sept. 25 issue of ELECTRIC RAILWAY JOURNAL on publicity and the use of motion pictures in telling the story of the railways.

We have used motion pictures in our safety campaign in the schools, in clubs and in every place where we could secure an audience. In the coming campaign when Toledo votes on municipal ownership and the service-at-cost plan the committee of citizens is planning to use the moving picture houses with a real campaign.

In considering motion picture advertising the advertiser must remember that only a few motion picture houses will run advertising pictures or advertising slides and they are generally neighborhood picture houses and often on the outskirts of the city. People go to the motion picture theater to be entertained and resent it if their time is taken up by a lot of advertising slides. Advertising to do much good must catch the people when in a receptive mood and if they have paid their money to see pictures and have to look at slides or at a motion picture that is clearly advertising propaganda they are not likely to let the message get far into their cranium.

There is a way, however, to get advertising into a picture when experts take hold of it and get a real cast and tell a real story so that there is a punch to it. I believe that the national association is in a position to secure and circulate such a film or films through the co-operation of the various companies. It is very expensive, however, and should not be attempted without plenty of capital.

E. B. KELSEY.

Need for Educational Film Is Now

VIRGINIA RAILWAY & POWER COMPANY
RICHMOND, VA., Oct. 4, 1920.

To the Editors:

I have read the editorial entitled "Proper Publicity, Its Need and How Shall We Get It" and the editorial suggestion headed "The Next Step in Publicity Work," appearing in the Sept. 25 issue of the ELECTRIC RAILWAY JOURNAL and have noted with keen interest the idea of filming the problems of the utilities for use in the "movies." The suggestion strikes me as being very good and I am sure would result in a better understanding of our difficulties.

Practically all over the country the problem of the electric railway industry is the same in the main; it is without credit and its franchises need revamping with a view to restoring its credit as well as for making them more flexible, ridding them of the many onerous taxes indirectly required, such as through paving, sprinkling and various other ways in different cities, all of which must reflect in the fare charged. It would seem to me that such a film might be very interestingly worked out along an educational line, reviewing the history of the electric railway industry, in which could be shown how the paving requirement is today the relic of horse-car days rather than a just requirement of the electric railway and how little the fare has increased in proportion to the costs of labor and materials. Such a film might be entitled "The History of the Trolley" or "The Past, Present and Future of the Electric Railway," featuring the possibilities of the trackless trolley in the smooth-paved residential districts.

Of course, the need for such educational work is now, and I presume it is too late to have any consideration at this convention of the American Electric Railway Association, but I think it should be made a subject for special consideration and study by that body. A. H. HERRMANN,
Editor *Public Service News*.

[Thomas S. Wheelright, president, writes that he fully concurs with the above views expressed by his assistant, Mr. Herrmann.—EDS.]

People Should Be Induced to Think of the Utilities

TERRE HAUTE DIVISION
TERRE HAUTE, INDIANAPOLIS & EASTERN TRACTION COMPANY
TERRE HAUTE, IND., Oct. 5, 1920.

To the Editors:

I think that the suggestion of using the motion picture is a very good one. I have long felt that there was a great opportunity to get the story before the people in this way, though how impressive it would be, or how lasting the effect, it is of course hard to say. Some years ago I secured "The King of the Rails" from the General Electric Company and got one of the movie managers to show it in his house as an extra film, and I watched its effect the first night it was put on. After the film was run the house applauded very generously, and that was the only time I ever saw an advertising or a propaganda film applauded.

We used the motion picture a little bit last year, as we have a photographer in town who takes moving pictures and runs them in one of the local houses every week or so, under the title "Weekly Pictorial Review of Terre Haute." The occasion was our annual employees' picnic, and we had the photographer take 200 or 300 ft. and include it in his "Weekly Review." This took very well and we heard a good deal of comment about it on the street.

The fact is that people do not think enough about the problems of public utilities, and have not done so in the past, and they should be induced to do so by any legitimate possible means. As the editorial suggestion says, it is not a job for one man or one mind.

If I were going to do anything along this line for the industry as a whole I would call in an expert moving picture producer, the best in his line if possible, and tell him the whole story and the purpose that I had in getting this story before the people through the medium that he could provide, then let him go away and think about it for a few weeks, or as long as he wanted to, and then come back and have another talk, when he could ask questions and straighten himself out on things that might not have been clear to him from the first conference. After that let him go away and work out some plan that he thought would be the best means of putting the story over. Of course, in order to be most effective, this style of publicity would have to have a good deal of local interest, but once the plan were decided upon local features could easily be worked out.

E. M. WALKER,
General Manager.

Pictures Must Be Entertaining and of General Interest

Many Problems Are Common to All Companies and They Could Be Woven Into a Broad Educational Film

BY FRANK WERT
Director of Public Relations Pennsylvania-Ohio Electric Company, Youngstown, Ohio

EVERY medium of publicity is good—for something. The question that bothers us from time to time is the selection of the best means to aid in selling the commodity, service or idea in which we happen to be dealing. What may bring excellent results in one case may prove of little value in another.

The editorial in the ELECTRIC RAILWAY JOURNAL of Sept. 25 on "Proper Publicity, Its Need and How Shall We Get It?" and the editorial suggestion on "The Next Step in Publicity Work," both dealing with the use of motion pictures as a medium for electric railway publicity, are most timely and open up a broad field for consideration.

That the motion picture presents an excellent medium for reaching the great bulk of the people need hardly be argued when the millions of persons who weekly attend the motion picture shows are considered and when it is recalled that there is hardly a village so small as not at least occasionally to have its "movie" attraction. It is also a well-known fact that "educational films" have been found valuable by a variety of businesses in acquainting the people with their methods and thus popularizing their product. In the railway industry itself pictures have been found helpful in accident prevention movements and, to a milder degree, in other ways.

The question then does not appear to be the value of the motion picture as a medium of publicity, but rather the ways and means of utilizing it acceptably and beneficially. In this regard two essentials (perhaps obstacles) come to mind:

First—The pictures must be interesting and entertaining as well as instructive.

Second—They must approximate conditions as they exist in the locality in which they are exhibited to carry conviction to the spectators.

In regard to this first condition, we must not forget that virtually all the old methods of advertising in motion pictures have been barred from the better classes of motion picture theaters. They were ruled out because they bored spectators who came to the theater for the sole purpose of being amused and entertained. It proved to be bad business to inflict upon these persons advertising slides and even the cleverer devices which, however, bore the indelible imprint of advertising.

Unless the film has sufficient merit to interest the larger number of the spectators it will be of little benefit. If they simply view it to endure it as it passes before their eyes little or no good can result. As was pointed out in the JOURNAL, the motion picture is a 100 per cent medium in that it is read by all its subscribers, but, by the same token, what is thrown on the screen must be interesting or the medium will soon be closed to such films. If an item in a newspaper is not interesting, it need not be read; if a part of a picture program is dull, it cannot be dodged, and the manager will find difficulty in filling the house at each performance, and that is what he is in business for.

For these reasons the wisdom of the suggestion in the JOURNAL that the making of pictures be in charge of competent and experienced picture men is apparent.

The matter of the acceptability of pictures from a local viewpoint, however, is one that lies largely with the railway management. It is probable, for instance, that a film, no matter how well designed, that revolves around the use of open summer cars would lose much, if not all, of its force in a community where that type of car is never seen. Again, traffic pictures taken in a city that has broad streets would seem to carry little conviction to the average spectator in a city where all thoroughfares are narrow. There would be unreality in the atmosphere of such pictures which would militate against the lesson of the film, whatever it might be, making the desired and necessary impression.

This is hardly so much of a problem for the railways which are contained within one of the larger cities. With them the expenditure of several thousand dollars for a picture wholly local in its scenes might well be worth while. It is, however, a problem of some moment to the properties which serve the smaller cities, or, perhaps, a chain of small towns, for the initial outlay for a local picture might prove prohibitive.

It is to such companies as the latter that the proposal to make pictures which can be used widely and generally has the strongest appeal, and certainly the development of a plan to this end will be awaited with interest by many of them, and would be of value also to the larger companies, even though they could afford to have their own pictures made.

This might seem like a difficult task, but it should not be deemed impossible. There are many problems of the street railways that, minor details excepted, are about the same throughout the country and in the solution of which the understanding and co-operation of the public is necessary. Films dealing with one or another of these might feel the way to effective motion picture publicity.

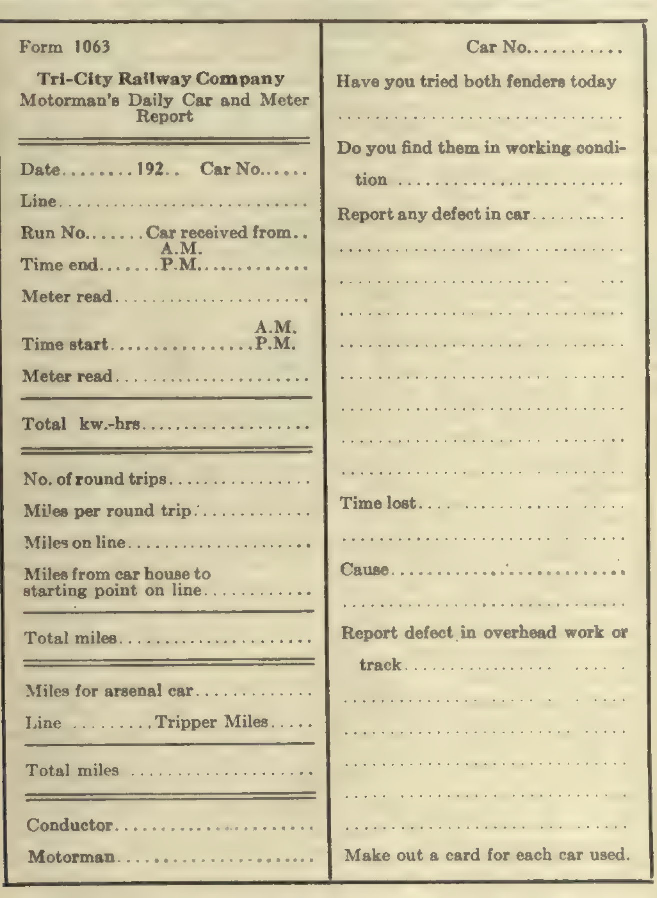
One such problem will suffice for illustration. A committee of the American Electric Railway Transportation & Traffic Association has been busy for the last two years on a code of traffic principles. The result of its work will be a generally accepted standard dealing with street traffic from the railway point of view. Regulation of street traffic is a subject of very general interest in all cities, large and small. It is a problem that is pressing for solution more and more each year. No doubt an interesting film could be built around this theme and no doubt many persons could be impressed with the need of local regulation and the direction that regulation should take. Salient points in regard to delays to traffic, accidents and the like could be further impressed upon the spectators by the judicious use of motion picture graphic charts. Perhaps arrangements could be made for the use of localized statistics for such charts to be inserted in the film, bringing this phase of the film close to home, even if the pictorial views must be of "foreign" cities.

Perhaps a better topic might be developed for the screen, but in any event the suggestion of the ELECTRIC RAILWAY JOURNAL that careful consideration be given to the use of motion pictures for publicity purposes deserves the attention of the managements of properties, large and small, throughout the country, and there can be no better time for the inauguration of such work than right now.

New Car-Mileage Report System

New System for Keeping Car-Mileage, Taken from Motorman's Meter Report Record, Adopted by Tri-City Railway

THE Tri-City Railway (Davenport, Iowa) installed 100 Sangamo meters during June, 1915, and twenty-five additional cars were equipped with meters one year later. This provides a complete equipment for all single cars. Two-car trains are not equipped with meters. For convenience in obtaining and recording car-mileage the Tri-City Railway has recently adopted a new system. A new form of report card has been adopted which includes space for meter reports, number of trips and mileage made on one side and defect reports on the other. As every car taken out of the carhouse must have a report card turned in for it, this provides a convenient record of obtaining mileage made by the different cars. The contract under which the men work allows a motorman fifteen minutes per day for turning in meter, accident and car reports. Any motorman who does not turn in reports is not allowed this time.



Form 1063

Tri-City Railway Company
Motorman's Daily Car and Meter Report

Date........192.. Car No......
Line..........................
Run No.......Car received from..
Time end.......A.M. P.M.............
Meter read....................
Time start................A.M. P.M.
Meter read....................

Total kw.-hrs..................

No. of round trips..............
Miles per round trip............
Miles on line...................
Miles from car house to starting point on line............

Total miles.....................

Miles for arsenal car............
Line ....Tripper Miles.....

Total miles ....

Conductor.......................
Motorman........................

Car No...........
Have you tried both fenders today
....
Do you find them in working condition ....
Report any defect in car...........
....
....
....
....
....
....
....
....
Time lost.... ....
....
Cause.........................
....
Report defect in overhead work or track................ .....
....
....
....
....
....
Make out a card for each car used.

REPORT CARD FOR METER READING MILEAGE AND CAR DEFECTS

As a convenience in carrying out this system, the correct mileage for each run is posted at the station and each motorman is furnished with a small book with the number of miles per round trip on each line, also the distances from all crossovers, junctions and turning points. This enables a motorman to deduct any lost miles, should he fail to make a complete run, and so correct his report for the actual mileage made.

When these reports are turned in they are looked over by the barn foreman for car defects and are then placed in trays. The correct mileage for each run is stamped on the tray so as to make it easy for the operating department to check the various reports for any wrong mileage or other mistakes. Where mistakes are found, the report is returned to the motorman and a correct report is put in its place. A record of the number of bad reports sent in by each motorman is kept and every time a report is returned to a motorman the number of incorrect reports received to that date is written on it. After these reports are checked by the operating department they are sent to the meter clerk to make out the car-mileage per line, the extra car-miles and the total car-miles. He also makes out a monthly meter record for each motorman.

After the meter clerk has finished, the reports are sent to the storeroom, where the mileage is kept for wheels, gears, pinions and lubricants. This new system has reduced the clerical work necessary for keeping mileage records by about 50 per cent and gives each department a correct record. It was quite a task to instruct the motorman in the correct method of figuring out the mileage, but now for every thirty days there averages but one incorrect report from every 300. An accompanying illustration shows the form of report card used.

Resolution by Investment Bankers

AT THE recent annual meeting of the Investment Bankers' Association of America, held in Boston, a resolution was adopted on Oct. 3 urging co-operation between investment bankers and the owners and operators of public utilities and regulating officials in laying the salient facts of public utility operation before the public. The full text of the resolution follows:

Whereas sound and constantly expanding public utilities are essential to the welfare and prosperity of the communities served;

Whereas the conditions resulting from the war have increased the costs of utility operation and of new money required for expansion, and prevented the growth of utility service to meet the increasing requirements of the public and of industry;

Whereas there is a recognized shortage of electrical power, and it is of vital importance to the industries of the country that means be found for providing additional power supply;

Whereas the street railway systems are so tied into the business of the nation that their rehabilitation, maintenance and growth must be permitted and provided by the public dependent on their efficient service;

Whereas the telephone and telegraph have become so important in our daily business and social life that they must extend their service daily to meet the public demands;

Whereas the diminishing coal resources and the increasing demands on the oil supplies throw additional burdens on the gas industries which can be met only by their expansion; therefore, be it

Resolved, That it is the sense of the board of governors of the Investment Bankers' Association of America that there should be co-operation between the investment bankers and the owners and operators of public utilities and the regulating officials in laying before the public full information respecting the vital importance of prompt and continuing expansion of all kinds of utility service, and in encouraging such utility regulation as will provide sound credit as the basis for financing, to the end that the investing public may provide the necessary funds by investment in sound public utility securities; be it further

Resolved, That copies of this resolution be sent to the Governors and the regulating authorities of the several states.

The *Literary Digest* quotes extensively from an editorial in this paper urging that those who use the highways should pay for their maintenance, or at least pay more than those who do not use the highways or who use them little.

News of the Electric Railways

FINANCIAL AND CORPORATE • TRAFFIC AND TRANSPORTATION
PERSONAL MENTION

D. U. R. Still Fighting

Alleges Illegal Use of Tax Money by City in Behalf of Municipal Railway Project

Argument is being heard before the Supreme Court of Michigan at Lansing in the suit brought on the motion of the Detroit (Mich.) United Railway seeking to compel Circuit Judge Henry A. Mandell to issue an injunction against the city of Detroit and the city officials concerned in putting out electric railway bonds purchased by the city treasurer and sinking fund commission.

The Detroit United Railway attorney argued that wrongful use was made of tax money by the city treasurer and sinking fund commission in the purchase of the bonds. He also argued that since the city charter prohibited the use of tax money in building or buying a railway, the bond issue was merely a subterfuge for evading that provision of the charter. It was further claimed that the sinking fund commission has authority to buy only such city bonds as are an outstanding debt against the municipality, and that the railway bonds which had never been issued did not constitute an outstanding obligation.

The suit is characterized by Corporation Counsel Wilcox as an attempt on the part of the Detroit United Railway to throttle the city because the company is opposed to competition in the city of Detroit. Mr. Wilcox maintains that the claims of the Detroit United Railway have already been disproved. The bonds which were purchased by the city treasurer and the sinking fund commission are now in the possession of the investing public, having since been sold. The sinking fund and the money in the city treasury are now intact.

In answering the claim of the Detroit United Railway that contracts let by the city for approximately 30 miles of municipal railway are void because they were made before the money was actually obtained for the railway fund by the sale of the bonds, Mr. Wilcox stated that the Detroit United Railway ignores the fact that it has been the practice for the past thirty years to enter into contracts as soon as bond issues have been authorized and before the bonds were actually sold. The validity of this practice has never been questioned before. The statement was made that the sinking fund commission not only had the right but was in duty bound to purchase the bonds since it is required to invest its money in city bonds if possible and at that time there were no other city bonds to be purchased in the market.

While the Detroit United Railway contends that the purchase of the bonds out of tax money was a form of juggling funds, it is claimed that the city could not sell the bonds since Detroit can pay only 6 per cent interest and the loan market at that time was 7 or 8 per cent. Former instances were cited where the city had to buy bonds in abnormal times, in order to allow the carrying on of municipal work. This action was never questioned before.

That buyers of large experience have not hesitated to purchase these bonds is cited as evidence that the suits filed by the Detroit United Railway are not being taken seriously by the public.

In the claims stated by the Detroit United Railway it is held that the bonds were illegally issued and that contracts made because of them were made illegal inasmuch as at the time the contracts were drawn there was no money in the railway funds with which to meet the obligations involved. The subsequent sale of these bonds to innocent purchasers does not validate the contracts and the bonds are still illegal, according to the company. It asks that the court issue an order to impound the money realized from the sale of the bonds to the public so that the city and investors might be protected.

Curtail Power Consumption

A threatened interruption in the railway service of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., will be avoided through the co-operation with the company by the business, manufacturing and amusement interests of the city in temporarily curtailing their use of electric energy during the hours from 7 a.m. to 7 p.m.

Twelve steel manufacturers who are among the heaviest users of electric power in Milwaukee have agreed to close their electric furnaces one day each week, two closing each day. Milwaukee theaters will also co-operate by eliminating all out-door advertising for five days in the week, from Monday to Friday inclusive. Similar action will be taken by the local grain milling interests. The Association of Commerce will endeavor to obtain the cooperation of other business interests.

The power shortage has been caused by an unprecedented demand for power. The first unit of a new power plant now under construction is expected to be ready for service in the near future and to relieve the situation. The cooperation of the public was asked through the medium of large advertisements in the Milwaukee newspapers.

$50,000,000 for 450,000 Hp.

Mr. Gaby Continues His Testimony on Hydro-Radial Costs—Estimates of Prospective Railway Business

At the sitting of the Ontario Hydro-radial (Sutherland) Commission in Toronto, Ont., during the week ended Oct. 23, F. A. Gaby dealt with the Chippewa Canal power undertaking now being constructed by the commission. The estimated cost for 450,000 hp. was $50,000,000. In addition there would be 160,000 hp. from the Ontario Power Company and 50,000 hp. from the Canadian Niagara Power Company for which the Hydro Commission was paying $12 per hp., and $18 per hp. for an additional 10,000 hp. Mr. Gaby stated that the cost would be $12 per hp., delivered to the radial railways at Niagara, and that after construction and maintenance charges were added this was $2 to $3 per hp. higher than was charged today.

200,000 Hp. at Chippewa

The original estimates for the Chippewa Canal power scheme called for only 200,000 hp., while the present plans provided for 450,000 hp., which could be developed for $9 per hp. per year.

With respect to the Toronto-St. Catharines radial electric railway as projected. Mr. Gaby estimated that 550,000 tons of general merchandise would be handled, of which 300,000 tons would be in carload lots. Most of this would come from the urban districts, while 65,000 tons would come from Hamilton.

On the Toronto & Suburban line the Hydro Commission was prepared to spend some $287,900 on improvements which would greatly better the service. A deficit was anticipated under Hydro management at first, but Mr. Gaby expected the increase in business to care for increasing operating costs.

Operating Ratio Advancing

On the London & Port Stanley, now under Hydro supervision, the operating expenses in proportion to revenue had been 66 per cent in 1916, 69 per cent in 1919 and 75 per cent in 1920.

On the Toronto & Eastern Railway, Mr. Gaby stated that when completed and extended into the centre of Toronto, the Hydro-radial line expected to handle 75 per cent of the downtown traffic from the Danforth district within a quarter-mile radius of the route during rush hours, and 60 per cent during non-rush hours.

At the sitting on Oct. 21 Mr. Gaby submitted estimates showing a total of 320 miles of track.

Mr. Mitten Outlines His Attitude

Reluctantly Accepts Commission's Order for Seven-Cent Cash Fare—Men Will Receive Higher Wages at Once

Thomas E. Mitten, president of the Philadelphia Rapid Transit Company, has announced that the company will accept the order of the Pennsylvania Public Service Commission fixing the fare to be charged in Philadelphia after Nov. 1 at 7 cents cash, four tickets for 25 cents. At the same time Mr. Mitten makes it plain that he is keenly disappointed that the commission has seen fit to impose upon the P. R. T. a form of fare increase for which it has not asked. Mr. Mitten has also announced that the company on Nov. 1 will begin paying its carmen at the rate of 72.5 cents an hour, and that they will be given back pay as soon as funds are available. The amount of back pay due the men approximates $1,000,000.

OFFICIALS of the company estimate that the 7-cent fare with reduced-rate tickets, free transfers and 3-cent exchanges, will yield less in revenue than the straight 5-cent rate sought by Mr. Mitten. Before the Public Service Commission had announced its decision, President Mitten was asked whether he was willing to try out any fare plan other than the one he had proposed. He declined to answer the question. It is believed now that he is quite willing to give the commission's plan a fair trial, knowing that if it proves unsuccessful, the blame cannot be put upon him.

MANAGEMENT DISAPPOINTED

Posters defining the company's attitude have been placed in all the cars. These posters addressed to the riding public read as follows:

> The Public Service Commission orders P. R. T. to collect 7 cents cash, four tickets for 25 cents, commencing Nov. 1, 1920.
>
> P. R. T., men and management, fought hard for the 5-cent fare and thank you heartily for your most generous help and appreciation. We are surprised and sorry that your big petition and your voluntary payment of the second fare did not receive more favorable consideration.
>
> P. R. T., men and management, value your friendship. We will try to hold the short distance riders by giving you the very best service possible under present conditions.

In announcing to the men that payment of the higher wages would begin at once, Mr. Mitten said:

> We are not quitters; we are not cowards. You must not feel that this is a defeat, because if you will remember when Tulley and I tried to teach you nine years ago what was in our minds in regard to the results to be secured by co-operation, we had more than one disappointment and you did not believe it in one telling. Now the tables are turned and you have become the teachers. You are trying to tell the world how peaceful relations can be established and maintained between capital and labor under our co-operative plan, and what wonderful economic results have been here secured.

POLITICIANS TO BLAME

> You are trying to tell Philadelphia and certain politicians that their failure to recognize our good work and great accomplishment cannot disturb the integrity of our organization. Courage is sustained when the cause is just. Setbacks such as we have just received only serve to strengthen our determination, even as the healthy, well-nourished tree is strengthened when its energy is driven back to its roots by the pruning of its branches. Strike talk must be discouraged for that harks back to earlier days. Strikes are the weapon of the ignorant; persuasion and persistency in the right are our great weapons and must prevail.
>
> You are, I am confident, going through with this fight in the same dignified way that you have thus far. This, despite the abuse of the Councilmen when you went down to present your petition, despite the thing that has been done to us here and now.
>
> There is unquestionably in this community a feeling that we have been wrongly dealt with. Our best remedy is to let that seed sink in and flourish. We have the right of this question and it is going to be impressed upon the people.
>
> We must not talk against our government, because in America our government is of ourselves. We all have our votes. We ourselves select our representatives. To find fault with our hand because it is not clean and therefore desire to cut it off is futile. We would clean our hand and it is again a useful member. So it is for us to work for clean government.

COMPANY'S CAUSE JUST

> The unrest of today that we see throughout the world is born of distrust and disbelief in the good intent of those in high places. P. R. T. men and management, have confidence in each other, and as surely as you and I now sit here we will succeed. Every seeming defeat we meet, such as now, but strengthens us, strengthens our purpose and weakens our enemy. Why? Because we are right and right must prevail.
>
> I do not want you to lose your dignity with your passengers. You will be asked, particularly by those who are not overly well educated, why this increased fare? I know what you have been saying; I know what I would be inclined to say, but I don't want you to say it. This is the reason for the window sign, which will have been placed in the cars. Take the contents of this window sign for your text and you cannot go wrong. We cannot lose so long as our cause is just. We have got the money to pay our rent.
>
> We will start our new wage scale Nov. 1 and we will accumulate the rest of the money as quickly as we can for your back pay. The amount due you for back pay up to Nov. 1, when we begin paying on the higher scale of wages, will be about $1,000,000, and when we pay this to you we will try to pay it in one lump sum, so that you may put it away and add it to your savings, for as sure as we are sitting here the time is coming, and coming soon, when prices will be lower, houses will be cheaper, and every dollar you save now, in your saving account, will have at least $2 worth of purchasing value in days to come.

Removal of New Jersey Commissioners Before Court

The Senate of New Jersey, in special session, has refused to confirm the appointment of the new Board of Utility Commissioners, named recently by Governor Edwards. In consequence it is expected the whole matter will now be threshed out through quo warranto proceedings instead of certiorari.

Supreme Court Justice Swayze refused to issue a writ of certiorari against the Governor at the behest of the members of the old board to review the executive's action.

The Senate in refusing to confirm the nominations referred them to the judiciary committee. The Senate also asked Attorney-General McCran to determine the legality of the Governor's act.

It is expected that the Attorney-General will apply for a writ of quo warranto to require the members of the present commission to show by what right they hold office.

In commenting on the refusal of the Senate to confirm the nominations, Governor Edwards said:

> It is the plain duty of the Senate to act upon the appointment of the new commissioners. They have the right of rejection if in their judgment any of the men I have nominated are improper appointments, but they have no right to hold up the business of the state by a refusal to act at all.

The message sent by Governor Edwards to the Senate with the nomination was as follows:

> As you are perhaps aware, charges were filed with me by the city of Jersey City against John W. Slocum, George F. Wright, Harry L. Knight and Andrew Gaul, Jr., former members of the Board of Public Utility Commissioners, for neglect of duty and misconduct in office. In accordance with the provisions of the statute, copies of such charges were served upon those former members and protracted hearings held.
>
> Full opportunity was given for the presentation of evidence by both sides. The result of the hearing was my finding that the charges had been proved. I accordingly removed the said persons as members of said Board of Public Utility Commissioners.
>
> It therefore becomes necessary for me to make certain nominations to fill the vacancy caused by such action. Those nominations accompany this message.
>
> It may be suggested that the removal of the persons in question was without warrant in law, and for that reason your honorable body should not act to confirm the new appointments. It is a sufficient answer, it seems to me, to say that the Supreme Court, to which the removed persons applied for relief, has refused to review the action of the Executive Department.

Improvements at Springfield Are Progressing Satisfactorily

Early in the year the Chamber of Commerce of Springfield, Mass., declared in favor of a monopoly of transportation by the Springfield Street Railway under proper regulation and guaranties. The wisdom of this action was certified to when Peter Witt presented his report on the Springfield Street Railway as an investigator employed by the city of Springfield.

During the winter the officials of the chamber held several meetings with officers of the Springfield Street Railway with a view to securing the extension of the Carew Street line to East Springfield, the double tracking of the St. James Avenue line from Thompson Street to the Westinghouse plant, and the extension of the Page Boulevard line to connect with the Indian Orchard line.

The railway from the beginning recognized the necessity for this work, but was unable to finance the extensions. The officials of the company realized that the Chamber of Commerce is not a financing organization, but that the extensions were necessary, and that the transportation facilities of the city must keep pace with its other activities.

The Chamber of Commerce decided to help sell $300,000 of bonds of the railway, this being the amount necessary to finance the projects mentioned. This issue has now been nearly all subscribed. The railway began the construction of the lines some time ago, and by the end of the year hopes to have the new routes in operation.

Employees Before Court in Receivership Case

Kansas City Trainmen Ask Court to Retain Present Management and Preserve Pleasant Relations

The presentation by representatives of employees of the Kansas City (Mo.) Railways of a promise and petition was one of the striking features of the receivership hearing in Kansas City on Oct. 21. The employees promised their co-operation in operation and service to the public, declared that they expected and would promote uninterrupted service and asked that present pleasant relations with officials be continued. Judge Kimbrough Stone, on the bench, expressed appreciation of the spirit in which the petition was offered, and said that the employees' suggestions would be considered.

ONE of these suggestions was that Col. Philip J. Kealy, president, be made a receiver, or continued as operating head of the company. Colonel Kealy, immediately after the petition was presented, declared that he had not been aware that such a recommendation was being considered and that it was unauthorized. He asked that the petition be disregarded as to himself.

Mr. Pew Speaks for Men

The employees were represented before the court by John P. Pew. He said that he did not appear in behalf of any one party of the receivership proceeding, but desired to speak for a moment. He explained that when the employees learned that the receivership proceeding was pending, they voluntarily circulated petitions for signature and subsequently asked him to appear for them. He represented 3,300 working people. The position of the employees was this:

> Perhaps 60 per cent of the gross receipts of the company go to pay for labor. Of every 8 cents you deposit for a fare practically a nickel goes to pay for labor. The pay-roll is about $6,000,000 a year. Their attitude is that the first interest to be considered is the public; that the next interest to be considered is the interest of the employees; and the third the property. The property, indeed, has right in this, but what it gets is incidental to these others, and unless these others are considered first then property rights are of little value.

He said that following the strike in December, 1918, a new operating organization had been built up around 200 platform men who remained in the service of the company. Moreover, a most comprehensive plan had been devised for collective bargaining and for the settlement of grievances, the details of which were set out in a book which he offered as evidence. Since December, 1918, no grievance had come up for settlement that had passed beyond the division committee. He then read the objects sought to be attained by the Kansas City Railways Employees' Brotherhood.

Employees Promise Co-operation

In concluding Mr. Pew said the employees promised the court, the receivers and the people of Kansas City that "we will work whole-heartedly and together for the good of the company and for service to the public. Under no circumstances will we permit any interruption of this service." The employees desired:

(1) That no outside labor interest or those not in the company's employ be given any part in the present proceedings. (2) That nothing be done to disturb the pleasant relations existing between the employees and their officers. (3) That Col. P. J. Kealy be retained either as a receiver or as the operating head of the company.

Mr. Pew apologized for speaking in behalf of parties not in actual interest to the suit, but expressed the belief that the court would welcome the suggestions of the employees and heed their request.

Mr. Kealy at this point stated to the court that he should like the record to show that the matter which Mr. Pew stated came to him as a great surprise; that it was not authorized and that while he appreciated the compliment, he would not have the court consider the matter as authorized by him. He respectfully requested that his name be withdrawn from any consideration in the matter suggested by Mr. Pew. He said:

> It is embarrassing and, while complimentary, I should like the court to consider the withdrawal of my name under the circumstances.

The court said that it was a source of gratification to know that the attitude of the employees was as stated. Assurance was given that the suggestions from the men would be carefully considered.

Except for the preamble the petition presented by Mr. Pew was as follows:

> Since the appointment of a temporary receiver there have daily appeared in the newspapers statements that numerous interests would ask representation. We respectfully submit that the interests of the 3,500 men whose daily labors make possible this public service, and whose livelihood is dependent upon the success of this company, are just as important as those of financial and civic interests.
>
> There have been rumors that those who left the service in December, 1918, without warning to the public, causing tremendous financial loss to Kansas City, and untold inconvenience to the public, would attempt either openly or otherwise again to interfere in the operation of this property. Such an attempt if successful could only result in bad feeling, factional strife and again allow of the interference of foreign agitators in the present situation.
>
> ### Labor Situation Good
>
> The labor situation on this property is without question the best in its history. The feeling between employees themselves and the relations between them and their officials are those of co-operation, mutual help and square dealing. Collective bargaining has been provided for and grievances are immediately adjusted. In the past eighteen months under our present officials this organization has been developed from practically nothing to its present state of efficiency. There are today only about 600 in the employ who were here prior to December, 1918.
>
> We therefore respectfully petition the court:
>
> 1. That no outside labor interest nor those not in the company's employ be given any part in the present proceedings.
>
> 2. That nothing be done to disturb the present pleasant relations existing between the employees and their officials. 3. That Col. P. J. Kealy, under whose leadership this organization has been built up, be retained either as a receiver or as the operating head of the company. We have confidence in his ability and we know that the spirit of co-operation he has made possible will result if possible in better operation than at present.
>
> Should a different man be placed at the head of this property it would require months for him to familiarize himself with the organization, the property and the service. The employees would be at a disadvantage, as would the public.
>
> ### Employees Promise Co-operation
>
> On our part we promise the court, the receivers and the people of Kansas City that we will work whole heartedly and together for the good of the company and for service to the public. That under no circumstances will we permit any interruption of this service.
>
> This petition is the joint effort of the Kansas City Railways Employees Brotherhood, to which over 2,000 employees belong, and of the presentation committees elected by and representing every employee of the company. It is the outgrowth of a unanimous feeling that we have won the right to ask representation before the court.
>
> The amounts opposite our names are subscribed for the purpose of employing counsel and defraying our expenses in the present proceedings.

On Oct. 22 Colonel Kealy addressed his fellow employees as follows:

> Your action before the Federal Court yesterday is one of the most remarkable examples of loyalty and co-operation in the history of the electric railway industry. There should now be no question in the mind of anyone where this organization stands in relation to agitators, dictators or outside labor interference. You have demonstrated that you are able to conduct your own affairs without such influence; that you have all the necessary machinery for collective bargaining, and that you have the ability to use it.
>
> I cannot find words to express my deep gratitude for your expression of confidence. There have been many heavy responsibilities connected with the Kansas City Railways, especially during the troublous times of the past eighteen months. The knowledge that I have had the respect and loyalty of my fellow employees has lightened this load and made a most arduous task a pleasure.
>
> In the pending proceedings I have no personal ambition. I have long looked forward to the day when I could with a clear conscience lay down the responsibilities my position imposed, when I could escape the ofttimes unfriendly criticism and publicity. I had thought the time had come when I could step aside.
>
> However, if I should be asked to continue the work we have carried on together, my acceptance would be only because of your wishes, and in the knowledge that I have behind me the united and loyal co-operation of a wonderful organization.
>
> Should my connection with the organization be severed, however, I shall take away with me the knowledge that I have enjoyed your friendship and respect, and that your co-operation has made possible the progress we have made in the past year. This knowledge is sufficient reward. Your action will remain a treasured memory. With all my heart I thank you.

As noted elsewhere in this issue Francis M. Wilson and Fred W. Fleming have been named permanent receivers of the railway.

Seattle Men Want Seventy-five Cents

Trainmen of the Seattle (Wash.) Municipal Railway have applied to Mayor Hugh M. Caldwell for a conference, with a view to revising their contract, looking toward increased wages. The communication to the Mayor points out that at a special meeting of the railway employees on Oct. 8 it was decided to ask for a conference between the employees, the Mayor and D. W. Henderson, superintendent of street railways, "at the earliest possible date." Among the demands of the men are the following:

All motormen and conductors to be paid 75 cents an hour; the regular day to be eight hours, with time a half for all time over eight and a half hours; guarantee of eight hours' pay a day, seven-hour runs to be considered a regular run; all runs not completed in ten consecutive hours to be paid half time for all time intervening. This affects "swing runs," where men work two or three hours, then are off for three or four hours, and return for a second shift. The men also ask that 75 per cent of the runs be made straight through.

All trainmen who work as extra men to be guaranteed $150 a month; all regular Sunday and holiday runs to be completed in 4½ to six hours, the same to pay eight hours; allowance for the ten minutes spent at the carhouse after reporting and before taking their cars; allowance of fifteen minutes extra time each day to turn in daily reports; extra time when relieving crews where it is necessary to report at the carhouse earlier than the customary ten minutes; guarantee of eight hours when regular runs are canceled; discontinuance of the practice of allowing men who have worked regular runs to take trippers or do other extra work; this change, the letter says, is designed to distribute the work.

Mayor Caldwell has not yet replied to the communication, or indicated what action will be taken.

Welfare Reports Published

The reports of the welfare departments of the Interborough Rapid Transit and the New York Railways for the year ended June 30 have just been made by H. H. Vreeland, director of welfare. The policy of the organizations is to benefit each and every employee physically, mentally and morally. The work is carried out under definite and concrete rules of helpfulness. The Bureau of Nurses alone made a total of 2,925 calls upon the sick.

Finding employment for the idle and assisting widows of employees to obtain the State Widow Pension, sending employees to the country to regain their strength and vigor are also practical demonstrations of what these benevolent organizations have been doing.

Not satisfied with caring for the physical comforts of the employees the Interborough and the New York Railways' welfare organizations offer educational advantages in the school for operators where training in the elementary theory of electricity is given.

In the matter of purely social activities in the interest of the entertainment of the employees in their non-working hours the past year has been a very successful one. The reports in detail are given in the October issues of the *Interborough Bulletin* and the *New York Railways Employees' Magazine*.

Toledo Awaits Local Election

Settlement of Franchise Matter There Overshadows the National Issues

The fight for a railway settlement in Toledo, Ohio, assumed toward the close of the campaign more importance than the national contests. The vote on Nov. 2 will be a double one with the possibility of approval of both municipal ownership and service-at-cost plans as submitted.

M. O. DEFEAT PREDICTED

On Oct. 28 the indications were that the twin bond issues for a municipal line will be defeated. Very little campaigning has been done in the city in behalf of the municipal ownership proposal, members of the municipal ownership commission, which drafted the ordinance, centering their energies on a drive against the service-at-cost franchise.

The election will provide Toledo citizens with the opportunity of making a definite and clean settlement of a problem that has kept the city from development for many years. The Doherty interests have operated the lines of the Toledo Railways & Light Company for more than six years. They inherited a bitter fight for franchise renewals. Past history has been dragged into the present battle for the service-at-cost plan.

W. L. Milner, chairman of the cost-of-service commission, has made a strong campaign for his ordinance. This measure Mr. Doherty and other railway experts have declared to be one of the best of its kind even though the company was forced to yield on many disputed questions. Of the two afternoon dailies, the *News-Bee* is fighting the franchise and favoring the municipal ownership propositions. Negley D. Cochran, its editor, has made a personal matter of the question with Nat Wright, editor of the *Blade*. The *News-Bee* has opposed a settlement of the issue for several years. Its editor once served on a commission which drafted a community ownership plan which at no time during the pending discussion had a chance for adoption. Many of the provisions of this grant, however, were better for the railway than the present service-at-cost franchise, which he is opposing.

RAILWAY OUSTED LAST YEAR

At the primary election municipal ownership was given a dreadful thrust. A few more than 20,000 voted on the measures. The registration for the Presidential election has totalled more than 89,000 and will be the largest expression ever polled on any railway matter in Toledo. It is thought the majority of the women voting will support the service-at-cost plan.

It is nearly a year since the famous ouster ordinance went into effect. That measure was directly responsible for the negotiations which have led to the plan of settlement now before the people.

News Notes

Algiers-Gretna Men Vote to Strike.—Motormen and conductors of the South New Orleans Light & Traction Company operating between Algiers and Gretna, La., have voted to strike on Nov. 1 unless granted an increase in wages. The officials of the company believe there will be an amicable arrangement between the company and the employees in view of the hoped-for increase in fares. The wage demand will probably be granted to the men if the Commission Council of New Orleans passes favorably upon the application of the company for increased rates.

Cities Asked to Operate Lines.—General Manager Pulliam of the Wisconsin Public Service Company, after testifying before the Wisconsin Railroad Commission that service in Manitowac and Two Rivers is given at a loss, invited these cities to take over the lines and operate the cars. The city is asking for extension of lines on the west and south sides. On the other hand, the company is demanding increased fare on city lines, dismissal of the petition for extensions, and the right to remove tracks on certain streets. The city contends that if the proper extensions were made the lines could be operated at a profit for the company. The matter is pending before the Railroad Commission.

City Planning Commission Promoting Inquiry.—The City Planning Commission of Kansas City, Mo., has appointed subcommittees to investigate and report on the following subjects of improvement: Transportation, industry, commercial districts, highways, zoning, residential districts, recreation. The committees have available data included in a report by George E. Kessler, adviser to the board of park commissioners. Mr. Kessler made a report of similar import more than twenty-five years ago, and as engineer assisted in putting that report on the landscape as the present park and boulevard system. His report on this present subject made special reference to the possibility of subways and elevated structures for diverting heavy traffic and alleviating congestion and to the possible necessity for interurban freight and passenger stations. It was intimated at the meeting that additional interurban lines may be expected to enter Kansas City. R. P. Woods, vice-president and general manager of the Missouri Short Line, an interurban electric road, was made chairman of the committee on transportation. Mr. Woods was formerly city member on the board of control of the Kansas City Railways.

Financial and Corporate

Trolleys Continue Decline

Long Island Roads Report a Decrease of Nearly 230 per Cent Over Year 1918

Electric railways operated by the Long Island Railroad show a total deficit for year ended Dec. 31, 1919, of $22,308. This is more then double the deficit of 1918. Five companies are included in the returns. Only one of these, the Ocean Electric Railway, is self-supporting. The net income of even this company decreased over last year by $13,000. The returns of the Huntington Railroad are not comparable, because the company was dissolved on Sept. 23, 1919, and a full year's report is not available.

Year ended Dec. 31, 1919	Ocean Elec. Ry.	Huntington R. R. †	Northport Trac.	Nassau County Ry.	Glen Cove R. R.	Total
Operating revenues	$205,578	$37,699	$11,645	$17,977	$26,400	$299,299
Operating expenses, taxes and uncollected railway revenue	153,708	48,133	18,017	20,721	28,018	268,597
Operating income	$51,870	*$10,434	*$6,372	*$2,744	*$1,618	$30,702
Non-operating income	302	155	212	212	212	1,093
Gross income	$52,172	*$10,279	*$6,160	*$2,532	*$1,406	$31,795
Deductions from gross income	50,993	2,340	586	38	146	54,103
Net income	$1,179	*$12,619	*$6,746	*$2,570	*$1,552	*$22,308
Dividends	None	None	None	None	None	None
Balance to profit and loss	$1,179	*$12,619	*$6,746	*$2,570	*$1,552	*$22,308
Outstanding capital stock	$35,000	$28,950	$45,000	$35,000	$10,000	$153,950
Outstanding bonds	$20,000	$26,000	None	None	None	$46,000
Miles of single track	15.59	19.97	2.74	1.60	3.50	43.40

*Deficit. †Dissolved Sept. 23, 1919.

Consent of City Needed

Saul Zielonka, City Solicitor of Cincinnati, Ohio, in a recent opinion returned to W. C. Culkins, street railway director, held that under the existing franchise the Cincinnati Traction Company cannot dispose of any property with a clear title without the consent of the city. The City Solicitor held that under the present service-at-cost plan and the recently enacted ordinance the city has an option on the company's property, and that the company is not in a position to dispose of its property without the consent of the city. The question was brought up after the railway had disposed of the Bogan Street carhouse without first notifying the office of the Street Railway Director.

Petition for Abandonment Denied

The Public Service Commission for the Second District of New York has denied the application pending before it for approval of abandonment of certain lines of the Kingston Consolidated Railroad, pending the disposition of an application to be made for a 7-cent fare in that city in place of the recent 6-cent fare. The Kingston Common Council has consented to the additional 1 cent, providing the commission shall find upon application made to it that the company is entitled to the advance.

Steps taken by the company to abandon certain lines were met with remonstrances by Kingston people and its Taxpayers' Association, and at a hearing before Chairman Charles B. Hill, Francis C. Merritt, representing the Taxpayers' Association, stated that in his opinion residents of Kingston would much prefer to pay a higher rate of fare than to see any part of the road abandoned. Mayor Palmer Canfield, Jr., expressed the opinion that a majority of the people would prefer to pay 7 cents than to have the line abandoned.

Chairman Hill holds that it is the duty of the commission to withhold its approval of the proposed abandonment and deny the application. His recommendation to the commission provides that the present proceedings may be renewed after the application for an increase in fare has been decided.

Surplus Earnings Increase

After Paying Preferred Stock Dividend Surplus of United Light & Railways Amounted to About $700,000

Surplus earnings for the United Light & Railways Company, Grand Rapids, Mich., for the year ended June 30, 1920, show an increase over 1919 of $145,000, or 26 per cent. This surplus was obtained after a preferred stock dividend of $603,000 had been deducted. The net income for 1920 was $1,302,599. Compared with $1,161,583 in 1919 the increase in net was $141,016, or 12 per cent.

Gross earnings of the subsidiary companies increased about $1,000,000. The operating expenses increased almost as fast, allowing the net earnings to be increased only $538,850, or 1.9 per cent over 1919. The net profit of the subsidiary companies due the United Light & Railways Company amounted to $1,935,605, an increase of $67,184, or 3.6 per cent. After adding the interest and dividends receivable, and miscellaneous earnings, and subtracting all the deductions for interest and general expenses, the net income was found to be $1,302,599 as previously mentioned.

This company is a holding corporation. It controls public utility concerns in Iowa, Indiana, Michigan, Illinois, and Tennessee. The total capital stock in the hands of the public amounts to $19,905,099. Total funded liabilities in the hands of public are $29,218,800, making total capital liabilities of $49,123,899.

Among the railway properties which the company controls are the Cedar Rapids & Marion City Railway, the Grand Rapids, Grand Haven & Muskegon Railway, the Mason City & Clear Lake Railroad and the Tri-City Railway & Light Company. These companies operate more than 200 miles of electric railway.

INCOME STATEMENT—UNITED LIGHT & RAILWAYS COMPANY

Year Ended June 30:	1920	1919	Percentage Change
Gross earnings of subsidiary companies	$10,695,639	$9,664,500	+10.7
Operating expenses (including maintenance, general and income taxes)	7,868,653	6,891,364	+14.2
Net earnings of subsidiary companies	$2,826,986	$2,773,136	+ 1.9
Deductions from net earnings:			
Interest on bonds, sub-companies due public	$681,008	$695,550	— 2.1
Interest on notes, etc., sub-companies due public	28,028	29,199	— 3 5
Dividends and earnings on preferred stock	170,238	170,795	— 0.3
Profit due minority stockholders	12,107	9,170	+32.0
Total deductions from net earnings	$891,380	$904,714	— 1.5
Net profit of subsidiary companies due United Light & Railways	$1,935,606	$1,868,422	+ 3.6
Interest and dividends receivable:			
On bonds and stocks of other companies	$1,241	$1,203	+ 3.2
On bank balances and certificates of deposit	6,122	5,816	+ 5.3
Miscellaneous earnings	545,271	323,289	+68.7
Total gross earnings of United Light & Railways	$2,488,240	$2,198,730	+13.2
Deductions from gross earnings:			
General expense, including taxes	$253,066	$178,530	+42.0
Interest on first and refunding 5% bonds	456,129	438,462	+ 4.0
Interest on 6% three and five-year bond secured gold notes	44,533	90,000	—50.5
Interest on 6% 2½ year bond secured gold notes, "series A"	72,252	90,000	—19.7
Interest on 7%, 5 year bond secured gold notes, "series B"	105,000	76,903	+36.6
Interest on 7%, one year bond secured gold notes, "series C"	57,807	......	......
Interest on 7%, bond secured gold notes, "series of 1920"	32,396	......	......
Interest on ten-year convertible gold debentures	120,000	120,000	......
Interest on commercial loans	44,458	43,252	+ 2.8
Total deductions from gross earnings	$1,185,641	$1,037,147	+14.3
Net income	$1,302,599	$1,161,583	+12.1
Preferred stock dividend	603,249	606,986	— 0.6
Surplus earnings	$699,350	$554,597	+26.1

Permanent Receivers Named

Messrs. Wilson and Fleming Placed in Charge of Affairs of Kansas City Railways

Judge Stone in the Federal Court at Kansas City, Mo., on Oct. 26 named two permanent receivers for the Kansas City Railways to succeed F. C. Niles, temporary receiver. The permanent receivers are Francis M. Wilson, now United States District Attorney, and Fred W. Fleming, real estate dealer, formerly manager of the Kansas City Life Insurance Company. Each will give bond for $50,000.

It was expected that the receivers would qualify before Saturday and have had time by then to reach conclusions as to certain contracts now under way. The court set Saturday morning for receiving the recommendations of the receivers and establishing the status of contracts, particularly that on the Twenty-third Street viaduct.

The final order appointing Messrs. Fleming and Wilson receivers of the company was made on the afternoon of Oct. 27 by Judge Stone. Midnight Wednesday was set as the hour for them to take charge of the property.

ORDER OF CLAIMS FIXED

The final order avoided establishing general rules for priority of claims and accounts. The receivers are expected to make up lists of bills due, of contracts and similar obligations, prepare their recommendations and present the lists, the recommendations and the opinions to the court.

The original order mentioned Aug. 1 this year as the date previous to which supply bills for operating necessities would not have priority, but the final order of the court on Oct. 27 threw all these bills into the class of other obligations, the status of which must be fixed after the receivers have considered them and reported to the court. Such listing and reporting to court will, it is considered, avoid the necessity for creditors coming in with intervening petitions as they will have their day in court.

Municipal Road Has Small Deficit

Fred Boeken, superintendent of the San Francisco (Cal.) Municipal Railway, expresses himself as well pleased with the showing of the railway for the fiscal year ended June 30. There was a deficit of $22,131, but at the present 5-cent fare this is considered auspicious, particularly as $486,551 was set aside for depreciation. The total earnings for the year were $2,729,015. Against this was charged off the following amounts:

Operating expenses	$2,002,101
Depreciation (18%)	486,551
Bond interest	233,503
Compensation insurance	28,991
Total	$2,751,146
Total earnings	2,729,015
Deficit	$22,131

Mr. Boeken states that the month of September was one of the best in the history of the road and that the system more than paid all charges last month with $7,000 actual net profit. In this connection Mr. Boeken said:

> If business keeps going through the fiscal year as it has started we will be able to wipe out any deficit that may have been shown for the last fiscal year and have a profit to the road's account in addition to the depreciation fund that we are gradually piling up.

Accumulated Shortage of $591,365 in Dallas

The Dallas (Tex.) Railway has issued a statement covering operation for the month of August and for the thirty-five months under the present franchise. The company operated under a 5-cent fare up to June 27, 1920, when a 6-cent fare was put into effect to continue for one year. It is pointed out by Richard Meriwether, vice-president and general manager, that the company even under the 6-cent fare has failed to earn the authorized 7 per cent on its invested capital by $24,574, and that the accumulated shortage on permissible return, covering the thirty-five months of operation under the franchise granted on Oct. 1, 1917, is $591,365.

The detailed financial statement of the company follows:

Total property value, determined in the manner provided by the franchise—close of business Aug. 31, 1920 .... $8,971,533

(This represents the amount of money invested in the actual property as agreed with the city, and is not the stock, bonds or outstanding securities.)

Authorized return—7% per annum on property value (for August) .. $51,884

(This is the 7% per annum on the amount of money invested in the actual property; not on stocks, bonds or other outstanding securities. It is the amount the company is permitted to earn by the franchise now in effect with the city.)

Gross income from all sources, month of August, 1920 .... $279,201

Operating expenses, month of August, 1920 251,891

(Operating expenses do not include interest on bonds, stocks, notes, commissions or discounts on loans or cost of raising money, Oak Cliff rental or dividends on stocks; these items are paid out of the "return," if any is earned; otherwise they are not paid.)

Balance earned for return, month of August, 1920 .... $27,309

(This is the actual amount of money earned during the month, and is the difference between the gross income and the operating expenses. Out of this return must be paid interest on bonds notes and securities, commissions or discounts or loans or costs of raising money, Oak Cliff rental and dividends on stock, if any.)

Shortage in permitted return, month of August, 1920 .... $24.574

(This represents the difference between the amount of money the city franchise says we are permitted to earn and the actual amount of money earned.)

Amount net earnings for August available for distribution to stockholders. None

Amount net earnings for August available for transfer to surplus reserve. None

(Self-explanatory. If there is a shortage in the "permitted return" for the month, there cannot be any money available for transfer to the surplus reserve.)

Total shortage for thirty-five months (Oct. 1, 1917 to Aug. 31, 1920, inclusive) on permissible return $591,365

(This is the total amount of money which we have fallen short of earning the 7 per cent per annum on the dollars invested in the actual property since we have been operating under the new franchise.)

NOTE—Six-cent fare became effective June 27, 1920.

Passengers carried in May, 1920 .. 5,682,705

Passengers carried in Aug., 1920 .. 4,955,580

Decrease in passengers carried in August compared with May 727,125

Bus Line Sold

Puget Sound Railway Disposes of Auto Lines Started as Experiment When Jitneys Appeared

A deal has been consummated whereby the transportation business of the Puget Sound Auto Bus Company, a subsidiary corporation of the Puget Sound Power & Light Company, has been transferred to Joseph Silver and W. W. Whipple, Seattle. Five 2-ton Mack trucks, the good will of the company and the assistance of the company that made the sale in getting the new owners started in the business are included in the deal. The amount of money involved in the transaction has not been made public.

The route heretofore served by the Puget Sound Auto Bus Company lies between Seattle and Bothell, a distance of approximately 19.5 miles. The bus system was organized about five years ago and developed by the Puget Sound Power & Light Company, under the capable direction of W. H. McGrath, vice-president. The line has maintained hourly schedule between Seattle and Bothell. It is understood the system has been well patronized and that some money was made.

TWO LINES STARTED

Shortly after the "jitneys" made their appearance on Seattle's streets the Puget Sound Traction, Light & Power Company, as it was then known, determined to go into the auto bus business, as an experiment, using the buses as feeders to its interurban lines. The company was after data; it wanted statistics on the cost of operating bus lines. Two lines were started, one between Bothell and Seattle, the other between Auburn and Enumclaw. The project was undertaken originally as the Washington Auto Bus Company, but later following a re-incorporation and the sale of the Auburn-Enumclaw line the name of the company was changed to the Puget Sound Auto Bus Company.

W. J. Grambs, manager of auxiliary operations of the Puget Sound Power & Light Company, handled the negotiations attendant upon the sale of the line. In speaking of the sale he said:

> We sold for several reasons. The two most pertinent ones are: first, we got a fair price, and, second, the business is too small for us to continue to engage in it. I believe it is safe to say, the Puget Sound Power & Light Company will not engage in the auto bus business again. What plans we may have had have been abandoned. We are through with the auto bus business. It is too small.

Mr. Grambs believes under private ownership the lines will thrive. He states that Silver & Whipple, the new owners, have gone about the proposition in a way that cannot help but produce results. Already they have interested patrons of the line by selling them stock in the company. The company is incorporated for $15,000. Shares in the concern are sold for $10 each. To date more than 200 shares of stock have been sold without solicitation.

Detroit Lines May Be Segregated —Company in Strong Position

Confirmation comes by way of Montreal of the rumor current in Detroit of the possible segregation of the suburban and city lines of the Detroit United Railway. A. J. Ferguson, vice-president of the company, resident of Montreal, says the company is in a position within its own resources to provide for its financial needs for a considerable time in the future. In consequence no temporary financing is contemplated. Demands upon the company for increased facilities are increasing and if any permanent plan of financing is adopted segregation of the lines will undoubtedly result. Mr. Ferguson is quoted by the Montreal *Gazette* as follows:

> The general situation of the company is that by reason of withholding increased dividends, representing a fair return on the value of its property it has employed in serving the public, the railway has accumulated a large surplus. In January, 1902, the company was authorized to issue $25,000,000 of bonds secured by a mortgage on its property, to provide for underlying bonds and to meet requirements from time to time with reference to the extension and development of its lines.
>
> It was considered at the time that the provision made by this $25,000,000 mortgage would provide for necessary extensions and betterments indefinitely, but the increase in population and the development of industries and commercial activities within the territory that is served by the company has been so great that the provision thus made has been exhausted, the mortgage having now been closed several years.
>
> The increased demand for extension of the company's system and general facilities continues, and our bankers have advised that before, or in connection with, the adoption of any permanent financial plan, the company's properties be segregated—the city lines from the suburban.
>
> If this plan, which is under consideration, shall upon full investigation and consideration be deemed wise, it would involve a reorganization to some intent, and also the adoption of a comprehensive program with reference to the financial needs of the company, both for the near and distant future.
>
> The company proposes efficiently to serve the people within the territory occupied by its system, having full regard to the future increase in population.
>
> If a plan of reorganization and for permanent financing be finally approved by the board of directors of the road it will of course be submitted to the stockholders for their consideration.

Utility Credit Cannot Be Injured with Impunity

Chester Cleveland, a member of Mayor Thompson's cabinet, and a special assistant corporation counsel of the city of Chicago before the Public Utilities Commission in matters affecting the Chicago companies, in a recent interview in the Chicago *Herald-Examiner* says that any newspaper printing a statement concerning a public utility company such as affects its credit or standing in the community and upon which full proof cannot be furnished may be sued for libel by the utility and a full recovery of damages obtained.

The city representative cited the point in connection with the suits for $20,000,000 damages brought by Mayor Thompson in the name of Chicago against two newspapers. In those suits it is claimed that articles were "recklessly and maliciously published" and have "made it difficult for the city to borrow money because of the alleged reflections upon the name of the corporation—the city of Chicago."

In commenting upon the suits, Mr. Cleveland said in the interview:

> If these newspapers persistently published that the Chicago Surface Lines or the Chicago Telephone Company or the Chicago Elevated Railroad, or any other of the great financial institutions of Chicago, were bankrupt and their credit exhausted, the corporation so libeled would undoubtedly sue for more than the city has sued in these suits.

The Chicago official says that not only could suit be brought and damages obtained because of publication of statements affecting credit, but that any other untrue charge which might hold a corporation, such as a public utility, up to ridicule or incite public feeling against it, would offer full grounds for legal action under the libel law, some such statements offering the basis for indictment and prosecution on criminal charges.

American Light & Traction Net Earnings Reduced

Gross earnings of the American Light & Traction Company, New York, N. Y., for the twelve months ended June 30, 1920, were $4,162,515 as compared with $4,211,398 in 1919, a decrease of $48,883, or about 1.2 per cent. The net income was $3,894,234, a decrease of $77,483, or 1.9 per cent.

During the twelve months, cash dividends on the preferred stock required $854,172, and the common stock $2,340,492. Stock dividends on the common required $2,340,491, making a total deduction for all dividends of $5,535,154, $79,338 more than the previous year.

Commenting on the action of the directors in cutting the common dividend from 2½ per cent in cash and stock to 1¾ per cent, quarterly, Alanson P. Lathrop, president, said:

> The reduction in common stock dividend as compared with previous quarters was deemed advisable in consequence of the decreased earnings due to the abnormal advance in cost of material and labor and to the necessity of conserving cash to take care of extensions and betterments required by subsidiary companies to meet franchise requirements.

Among the railway properties controlled by the company are the Muskegon Traction & Lighting Company and the San Antonio (Tex.) Public Service Company.

INCOME STATEMENT—AMERICAN LIGHT & TRACTION COMPANY

Year Ended June 30:	1920	1919	Percentage Change
Earnings on stocks of subsidiary companies owned by this company...	$3,215,996	$3,417,867	— 5.9
Miscellaneous earnings	946,519	793,531	+19.3
Gross earnings	$4,162,515	$4,211,398	— 1.2
Expenses	268,281	239,681	+11.9
Net earnings	$3,894,234	$3,971,717	— 1.9
Surplus reserve June 30, 1919	11,150,696	12,634,796	—11.8
Total surplus earnings	$15,044,930	$16,606,513	— 9.4
Dividends deductions for 1920:			
Cash dividends on preferred stock	$854,172	$854,172	......
Cash dividends on common stock	2,340,492	2,300,823	+ 1.7
Stock dividends on common stock	2,340,491	2,300,822	+ 1.7
Total dividends	$5,535,155	$5,455,817	+ 1.5
Surplus balance June 30	$9,509,775	$11,150,696	—14.7

Winnipeg Bus Costs Are 25.71 Cents per Bus-Mile

Experience of the Winnipeg (Man.) Electric Railway with its motor bus service in operation since May, 1918, indicates that the motor bus can be used to the best advantage in a new district where travel does not justify the initial cost of railway construction.

The company operates seven sixteen-passenger buses on routes which serve as feeders to the railway. Only five buses are in regular operation, the others being held in reserve for emergencies. The bus services were started as an expedient. It is the company's intention to replace the buses with electric railway service when conditions warrant. The company has prepared a statement covering the cost of operating five of these buses for the seven months ending July 31, 1920. The figures follow:

Cost of five busses		$12,930
Total miles operated		66,183

	Total Costs	Cost per Mile, Cents
Drivers	$5,366 30	8.12
Tires	980 84	1.48
Gasoline	3,593.14	5.42
Oil	328 90	.48
Labor for repairs	2 056.42	3.11
Materials for repairs	1,072 91	1.62
Storage rental	350 00	.53
Insurance:		
Liability $630 00		
Fire 52.78	682.78	1 06
Taxes including driver's licenses; provincialand city car licenses	152 00	23
General expenses, including supervision, accounting and other overhead expenses	312.93	47
Total of above expenses	$14,896.22	22 52
Depreciation	1,508.50	2 28
Interest on investment	603.40	91
Total costs	$17,008.12	25 71

It will be noted from the above that motor bus costs total 25.71 cents per bus mile. The cost of street railway service in Winnipeg during the same period was 27.60 cents per car mile. In the comparison it is seen that there is a difference of 1.89 cents per mile in favor of the bus, but this makes no allowance for the greater carrying capacity of the car. Another factor is the increasing price of gasoline. Gasoline in Winnipeg cost 37 cents per gallon in January last, 47 cents last June and in October is costing 51 cents. The price for electricity, on the other hand, has remained practically constant.

International $44,735 Behind

The income account of the International Railway, Buffalo, N. Y., for the period from Jan. 1 to Sept. 30 follows:

Operating revenue	$8,249,140
Operating expenses	A-6,370,064
Net operating revenue	$1,879,076
Taxes	495,534
Operating income	$1,383,541
Non-operating income	38,815
Gross income	$1,422,357
Deductions from gross income	1,237,209
Net income	A-$185,147

A—Does not include $229,882 additional charge for the six months January to June necessary to comply with the Public Service Commission formula for the determination of the proper allowance for depreciation.

Financial News Notes

Municipal Road Authorizes Bonds.—The municipally-owned Norton & Taunton Street Railway, Taunton, Mass., has authorized a further bond issue of $30,000, to be shared equally by the cities and towns, for the purpose of providing car and power additional equipment.

Decade Average Values in Iowa Valuation.—The report of the property appraisal of the Tri-City Railway of Iowa in Davenport will probably not be filed for another month. The appraisers will furnish data on replacements for 1920 as well as an average of replacement values for the period since 1910.

Lee-Huntington Line Being Removed.—The work has started of removing that part of the Berkshire Street Railway from Lee to Huntington, Mass., built in 1913 when the road was under New Haven domination. Ten or twelve miles of track will be removed. There has been no regular service by the company over the road for several years now.

Receipts Falling Off in Baltimore.—According to Herbert B. Flowers, general manager of the United Railways & Electric Company, Baltimore, Md., the number of fares to be shown on fall records will be below that of the past few years. Half-time operation and abandonment of night shifts in many industries are being reflected in the company's receipts.

New Note Issue Plan.—It is expected that the one-year 6 per cent notes of the Hagerstown & Frederick Railway, Hagerstown, Md., will be paid at maturity, new financing having been arranged to provide funds therefor. It is contemplated that a new issue of $1,050,000 of 8 per cent notes will be issued, to be dated Oct. 15, 1920, secured by collateral pledge with the trustees.

Petition for Abandonment Denied.—A petition of the Delta Light & Traction Company, Grenada, Miss., for authority to abandon its railway service was heard recently by the Railroad Commission and the petition was denied. Disposition of the matter is now pending in the Circuit Court on a writ of certiorari with prospects of a settlement at a conference between the Mississippi authorities and the officers of the traction company.

$13,000,000 Issue Planned at Youngstown.—A syndicate of local investment houses in New York has purchased and will probably offer to investors soon $13,000,000 of twenty-year 7½ per cent bonds of the Pennsylvania-Ohio Electric Company, Youngstown, Ohio. The proceeds of the sale will be used in part to redeem $11,967,000 of 5 per cent bonds of the Mahoning & Shenango Railway & Light Company maturing on Nov. 1.

Paducah Company Reports Profit.—An amended bill of complaint showing earnings from operation for twelve months ended Sept. 30 has been filed in the Federal Court by the Paducah Street Railway. The amended bill submits a detailed account of its business and an estimate of the value of its properties. The total revenue of the company was $159,424, and the cost of operation, excluding taxes and depreciation, was $129,590.

Road at Carlisle to Suspend.—The committee representing the holders of the bonds of the Cumberland Railway, Carlisle, Pa., has announced that operation of the road will be discontinued on Nov. 1. The road extends from Carlisle to Mt. Holly Springs Park and Newville Glens Springs Park. The property of the railway was sold under foreclosure recently, following failure by the company to pay interest on outstanding bonded indebtedness.

Hearing by Court on Service Suspension.—Federal Judge Julius M. Mayer has issued a temporary injunction restraining the Public Service Commission from bringing action in any court other than that of the United States to compel Lindley M. Garrison, receiver for the Brooklyn Rapid Transit Company, to operate certain lines which have been idle since the strike two months ago. A hearing on the injunction is to be held on Nov. 1. Residents of Brooklyn deprived of service are protesting vigorously against the abandonment.

Threat to Surrender Franchise.—Surrender of the franchise held by the South Covington & Cincinnati Street Railway in Cincinnati, Ohio, is probable if the present agreement between the city and the company cannot be amended by act of the City Council, it recently developed at a conference of W. W. Freeman, president, and Polk Lafoon, general manager of the company, with W. C. Culkins, Director of Street Railways. A clause in the present franchise specifies that not more than a 5-cent fare may be charged on this line as long as that is the rate paid on the Cincinnati Street Railway. Whether this can be interpreted to warrant a 3-cent increase on the "Green Car Lines" following the precedent established by the Cincinnati Street Railway will be passed on by the Cincinnati City Solicitor.

$28,702 Needed for Hyde Park Line.—An expenditure of $28,702 is necessary to put into safe and proper condition the roadbed, tracks, poles, wires and other appurtenances of the Hyde Park railway system for its operation for one year by the Boston (Mass.) Elevated Railway, according to a report Mayor Peters has received from the State Department of Public Utilities. To put the system into safe and proper condition for five years operation $68,208 is needed according to the report. The city will provide $30,000 under the provisions of a legislative act of this year. The city has appropriated so far this year $80,000 for Hyde Park transportation facilities. Of this sum $30,000 remains unexpended. This will probably be used to meet the $28,702 expense estimated by the Department of Public Utilities.

Reorganization Rumors Denied.—Rumors to the effect that an early reorganization of the Pittsburgh (Pa.) Railways, now in the hands of the receiver, will be made are denied by W. A. Thompson, president of the Philadelphia Company, which controls the Pittsburgh Railways. He says reorganization is out of the question until the matter involving the foreclosure of the Southern Traction Company, a subsidiary, is straightened out and that this seems a long way off. Receivers Charles L. Fagan, S. L. Tone and W. D. George also declare there is nothing to the rumor. They say the report developed through the visit to Pittsburgh of Eastern bankers, who hold bonds of the Philadelphia Company, to look over the physical properties. This they do frequently. No unusual significance is to be attached to their trip now.

May Buy Bay State Property.—The property of the Bay State system in New Bedford, Mass., controlled by the Eastern Massachusetts Street Railway, is desired by the Union Street Railway. This company will offer to purchase the Bay State line from Lund's Corner to the city line. There has been a temporary agreement under which the Union Street Railway has been operating cars over the Bay State tracks to Sassaquin. This agreement will expire on Dec. 1. If the trustees of the Eastern Mass. Street Railway should refuse to sell the road the line might be torn up. In this event the Union Street Railway will probably build a new system on the present location. Homer Loring, chairman of the trustees of the Eastern Massachusetts Street Railway, seems anxious to hold on to the line in the hope that the Legislature of next year will do something toward having the company which now owns the line restore its abandoned service.

Traffic and Transportation

Galveston's Need Great

Company Seeks Injunction Against City in Fare Case—Engineers Differ on Valuation

Henry J. Dannenbaum, special master representing the Federal District Court for the Southern District of Texas, has concluded the taking of testimony in the suit of the Galveston Electric Company against the city of Galveston. The company is seeking an injunction restraining the city from enforcing the provisions of a municipal ordinance limiting the fare on the local lines to 5 cents. The railway contends that the 5-cent fare, which was reimposed by the city after a 7-cent fare had been installed, is confiscatory.

The chief points of difference between the engineers who made surveys of the property are: The amount of going concern value to be added to the "bare bones" value of the property in order to determine a valuation for rate-making purposes; the probable reproduction new value of the property; the amount of accrued depreciation now existing as pertains to the company's property; the amount to be allowed the company annually from current earnings as depreciation value, and the rate of a fair return which the company should be allowed to earn on the valuation figure thus arrived at.

DIFFER ON VALUATION

The engineers have reached an agreement on the undepreciated record cost of the property from 1881 to June 30, 1920, which they place at $2,100,537, exclusive of the value of the franchise and of material and supplies on hand. They have also reached an agreement on the undepreciated cost of reproduction new of the plant on a historical basis, exclusive of franchise value, going concern value, bond discount and brokerage fee. This they place at $1,720,000.

Consideration was given in this estimate of $202,000, consisting of overhead expenses; $136,281, cost of grade raising, together with various estimations made on the cost of rails. This item also includes $186,000 worth of transmission property. Other material issues that have been reconciled by the engineers are the record costs of the property and the reproduction value based on the prices at which the component parts of the plant were purchased.

H. P. Gillette, valuation engineer representing the company, offered statistics to show that the company had earned a fair return on its investment in only ten years since 1881, and that the company is now facing receivership unless relief is afforded in increased earnings. Mr. Gillette testified that during the years when a fair return was earned, the company earned 8 per cent after 1.5 per cent of earnings had been charged off for depreciation. He also offered testimony to show that the company's plant had been practically rebuilt during the last twenty years.

Henry E. Elrod, representing the city, maintains that the annual depreciation should be balanced by the development, in so far as these two items are equal, for with the funds allowed for depreciation new equipment is purchased and new parts of the plant installed to replace the old parts. The two engineers are more than $100,000 apart on the matter of accrued depreciation.

Attorneys for the city, basing their calculations on Mr. Elrod's findings, maintain that the company is now making a return of 8 per cent on its invested capital. The company's representatives assert that a rate of 8 per cent return would be adequate, but that the company is not now making anything like that per cent. The difference in the two calculations lies in the amounts to be charged off for development and maintenance and for depreciation.

Concessions for Steady Riders

Regular patrons of an electric railway are entitled to concessions in the shape of reduced rates, according to an opinion recently handed down by the Pennsylvania Public Service Commission. The commission ordered the Buffalo & Lake Erie Traction Company, Buffalo, N. Y., to reduce the ticket rate on its lines in Erie, Pa., from 7.5 cents to 6¼ cents. The railway was authorized to continue charging an 8-cent cash fare on its Erie lines. For rate making purposes the commission fixed the value of the company's lines in Erie at $4,100,000.

Commissioner Rilling, in ordering the reduction, said that every one who regularly uses an electric railway line "has more than a temporary interest therein." Mr. Rilling remarked that "the house in which they live has a greater value if the means of communication between it and their place of business is adequate and ample." He said further:

> A reciprocal regard by the utility and the public for their respective interests and duties and a frank avowal of respective obligation and interdependent relations, would be most helpful in adjusting any conflicting situations that may at any time arise.
>
> It is important that the service rendered a community by its public utility be efficient, economical and adequate, the same as its fire department or any of its other local governmental functions. * * *
>
> Rates to be paid utilities should not be maintained at a fixed and definite stationary amount, but should reflect the conditions under which each is obliged to operate; same to be increased or decreased as existing conditions require.

Fare Settlement Nearer

Court Orders Des Moines Receivers to Curtail Wage Payments Unless Adjustment Is Reached

Federal Judge Martin J. Wade has issued an order looking to a permanent settlement of the financial difficulties of the Des Moines (Iowa) City Railway. Judge Wade has ruled that unless a permanent fare adjustment has been made within thirty days, the employees of the railway shall be paid the back wages due them only in such amounts as shall be available after the payment of operating expenses, including current wages.

Judge Wade has also annouced that he will appoint a special master to recommend to the court a plan for the relief of the company. He has declined to sanction a further increase in fare pending the master's report. A temporary 6-cent fare is now in force.

In handing down the order Judge Wade said:

> I find that contrary to expectations the extra 1-cent fare provided in order heretofore made has reduced the travel so that there is little left, after paying the current advanced wages, to apply on the back pay. I also find that the company is not earning enough to meet fixed charges. I intended of course that the net results from the 1-cent increase should be applied upon wages.
>
> CANNOT DEPLETE OPERATING FUNDS
>
> Last month the full amount from the 1-cent extra fare was so applied and under all the circumstances I feel that the same should be done this month, but of course this cannot continue. As I have repeatedly said, I cannot take the money which belongs to other funds to pay the advanced wages, and I am only making this order in the hope that before another month is up some plan will be devised which will make some definite provision for payment of a substantial amount each month upon the back wages.
>
> I do not feel that I am justified in making another advance in fares until the matter has been thoroughly considered whether it is possible for the city to work out some plan to take care of this emergency. I am going to appoint a master not with any view of fixing permanent fares, but with a view of arriving at a plan which will carry the company a few months in the hope that by that time something definite will be done by the city. The street railway cannot run unless there is enough income to pay wages and fixed charges. There is no question of profit involved, because the company is willing to operate so long as the expenses of operation can be paid from income.

The 6-cent fare was authorized by the court last August to allow the company to grant a demand of its carmen for an advance in wages from 60 to 70 cents an hour. The men subsequently struck because of the failure of the order to provide for the payment of back wages. Judge Wade thereupon made the wage increase retroactive to March 1.

One-Man Cars for Morgantown

One-man cars will be operated on the loop lines of the West Virginia Utilities Company, Morgantown, W. Va., at an early date. J. K. Buchanan, general manager, said:

> We have reached the point where we cannot operate and maintain the loop line with our present revenues. I do not believe that higher fares would solve our problem, because if we boosted the fare the volume of passenger traffic would be reduced to the point that our income would be no greater than at present. We have finally decided upon the one-man car. In the past few years this style of car has become increasingly popular and each month sees its introduction into more towns. It is no new thing.

Ten-Cent Fare in Connecticut

Commission Grants Company's Application for Higher Rate as an Emergency Measure—Zone System Completely Scrapped

The Connecticut Public Utilities Commission on Oct. 22 granted the petition of the Connecticut Company, New Haven, for a straight 10-cent fare on its lines throughout the State. The new rate goes into effect on Nov. 1. The only exception where the ruling does not apply is in the New London territory, where a 10-cent fare is already being charged. Free transfers will be continued. Commutation tickets will be issued good between the traffic centers of towns. The present fare on the other lines within the State is 7 cents. The commission explained in its decision that the ruling was only temporary, as the commission hopes that when the Legislature convenes next January it will solve the traction problems that exist throughout the State. The order granting the increase was signed by Commissioners Richard T. Higgins and Joseph W. Alsop. Commissioner C. C. Elwell opposed the 10-cent fare and filed a dissenting report.

WHEN the 10-cent rate goes into effect the zone system will be scrapped completely and the fare limits which prevailed under the former 5-cent rate will again come into existence. The zone system was put into effect in November, 1919, and was modified in May and again in August, but has never been a paying proposition to the traction company in any section of the State.

Lucius S. Storrs, president of the company, contends that the 10-cent fare is a partial but not a complete solution of the State's traction problems. He holds that the provision in the commission's ruling that the trolley question is to come before the Legislature does not necessarily imply that fares can be reduced at that time, even if the Legislature gives the railway relief from taxation. He points out that the large amount of unpaid taxes would have to be handled and provided for before reduction of fare rate could take place even if relief is given in other respects.

LEGISLATURE MAY ACT

Several of the Connecticut cities, which at first thought of appealing for a rehearing on the commission's order have decided to await legislative handling of the transportation problem of the state. There is a realization that both the Connecticut Company and the Public Utilities Commission are laboring under certain restrictions in that neither can take any steps regarding jitney competition or the elimination of any of the various imposts, both of which make the fare situation difficult. The legislature convened in January and while it failed to make any move in 1919, the situation has grown so acute that public sentiment will demand action in 1921. Under the Connecticut borough system of legislative representation however, the suburban and rural districts are in control, whereas the fare situation is more acute in the cities.

The fare change from 7 cents urban and 6 cents per two-mile suburban zone to 10 cents on the old 5-cent zone limits needs explanation in order that the real change in charges be understood. The actual effect is that all 7-cent riders under the present scheme will pay 10 cents under the new and practically all 13-cent riders will pay 10 cents. This practically covers the various city areas.

Outside of the cities, the new rate per mile is the same as the present—namely approximately 3 cents. In other words the new rate will be 10 cents for the old 5-cent zone of about 3 miles. The ultimate result therefore is that the congested city rider is raised from 7 to 10 cents, the rider on the outskirts has his fare reduced from 13 to 10 cents, whereas the suburban or interurban rider is charged the same as before.

MONTHLY TICKETS CONTINUED

The Connecticut Company under the new schedule will not return to the form of commuters' ticket book, issued under the old fare system, but will issue monthly commuters' tickets as at present on the basis of 2.5 cents a mile. An undated commuters' ticket book would annul the effect of a 10-cent fare on those lines on which commuters' rates apply, company officials state, since a large majority of passengers would ride on commuters' tickets. Under the present system of monthly tickets only those who make use of them every day buy them and all others pay single fares.

The commission's order reads in part:

> The Connecticut Company is hereby ordered and directed to establish and put into effect on its entire system, excepting the New London Division, on and after Nov. 1, 1920, a flat 10-cent fare with fare limits based upon the original 5-cent fare areas, as per plan and schedule filed with the commission, entitled: 'Schedule of Fare Limits, Docket No. 3429,' with free transfers at all established transfer points; and the company is authorized to make such mutual adjustments of apparent inequitable fare terminals and lapovers as herein before referred to in this finding.
>
> School tickets shall be issued at one-half the above regular rates.
>
> The company shall issue commutation tickets good for round trip daily, between the traffic center of any incorporated city or borough having a population of 25,000 or more according to the latest authenticated census, or any designated point within such city or borough and points more than five miles distant therefrom, on all lines radiating from such traffic centers, for the number of days in any month, less Sundays and legal holidays; such commutation tickets to be sold at the rate of 2.5 cents per mile; to be issued to the individual commuter and be non-transferable and to expire at the end of each month.
>
> All previous orders of this commission inconsistent herewith are hereby cancelled and annulled.

In granting the new rates the commission said in part:

> It is apparent from all the facts connected with this case that the flat 10-cent fare proposed by the company is not excessive, viewed from the point of producing more revenue than the company is legally entitled to, and no logical maximum rate that the commission could establish would produce sufficient revenue under existing conditions and only partially restricted compeition to wipe out, short of several years, the existing past due obligations of the company and to pay thereafter a fair return on the value of the property after the payment of proper operating expenses, fixed and overhead charges.
>
> Assuming a return to the flat fare on the original fare limits, which seems to be generally desired, the question for the commission to consider and determine at this time is what the flat rate should be for such fare limits—whether 7, 8, 9 or 10 cents.
>
> The interlocutory order issued July 30, 1920, was a temporary adjustment and the commission feels that any order issued by it at this time should and will have to be of a temporary nature as to its duration and effect. The commission, under the direction of the Legislature, is making an investigation of street railway conditions in Connecticut, and will report to the next General Assembly, and expects to be able to make some recommendations which with legislative action will tend to solve or at least relieve the present street railway difficulties. Pending such investigation, report and legislative action, the adjudication and establishment of rates for street railway service will of necessity be of a temporary nature. . . .
>
> As stated in the interlocutory order, the commission is of the opinion that the general public would prefer a return to substantially the old flat rate zones or fare limits and the establishment of a system of flat rates for such fare limits, although certain communities have expressed the desire for a distance tariff outside of the original city zone or fare limit.
>
> The plan and schedule of zones or fare limits filed by the company in connection with its petition for a 10-cent flat fare, are substantially the same as the zones or fare limits established and maintained by the company under the original 5-cent flat fare. As previously expressed by the commission, those fare limits are not in all cases equitable, being in some cases unfair to the company and in others unfair to the traveling public, and any adoption at this time of the original fare limits should be with the understanding that certain inequalities and defects should as soon as convenient be adjusted and ironed out by the company in conference with the patrons involved, and when necessary under the order and direction of this commission. . . .
>
> It is with extreme reluctance that the commission at this time contemplates the necessity of a further increase. We feel impelled, however, to the view that it is of vital importance . . . that the railway industry be preserved, even at the cost of a high rate of fare, pending a more final and permanent solution. . . .
>
> Provided there had been no unfair burdens resting on the company, in the nature of paving and bridge obligations, and had it not for the past five years been confronted with the unregulated public service automobile, * * * we believe there would have been no need for a petition to increase the rate to 10 cents at this time. . . .
>
> Taking into consideration all the facts connected with the case . . . we are of opinion that pending the final investigation and report of this commission to the Legislature, and possible legislative action thereon, the flat 10-cent fare asked for by the company, based on the original 5-cent fare limits, should be granted as just and reasonable maximum rates and charges at this time.

Commissioner Elwell's dissenting report reads in part as follows:

> The Connecticut Company was warned by this commission not to adopt the distance tariff system before holding a public hearing, but the warning was unheeded, and after eight months' trial the experiment was pronounced a failure by President Storrs when he appeared before the commission asking for a change to the present rate, which was granted as a temporary measure, and since Aug. 9 the company has been operating under the 7-cent city area collection, with 3 cents per mile for suburban territory.
>
> Figures furnished by the company showed that it received about 12 per cent more revenue between Aug. 9 and Sept. 30 than was collected for the corresponding period of the previous year. What it would have collected had there been no change from the old 6-cent rate is problematical. . . .
>
> In less than three months this whole matter will be in the hands of the State Legislature for adjustment. In the meantime, I believe we should allow the company to re-establish the old 5-cent limits with the same lapovers and charge 7 cents where they originally collected 5 cents.

Full Jurisdiction Exercised

California Commission Defines Its Authority in Granting an Increase in Freight and Passenger Rates

Apprehensive of a construction being placed on its recent action in granting increased rates to the railroads to conform to those granted by the Interstate Commerce Commission as having been a concession of the powers of the State to the mandate of a national governing commission, the State Railroad Commission of California addressed a communication to the Interstate Commerce Commission clearly defining the legal position upon which it desires to stand.

The state commission declares that its decision in the matter of increasing the rates in California was to place them on a parity with the rates granted by the national commission and that its action was based on the policy and practical needs of the situation rather than what the commission construed to be a mandate of the law. The state commission firmly sets forth its opinion "that the powers of the state authority over intrastate rates have not been nullified or reduced by the transportation act."

Inclosed with the communication was a copy of the California Commission's rate decision in which the commission voiced its opinion that practical necessity demanded the adoption of the interstate commerce rates for intrastate business. The California Commission then says:

"We are now without challenge exercising full jurisdiction over state rates."

There are now pending before the Interstate Commerce Commission several cases involving the power of that body to increase state rates resulting from the failure or refusal of several state commissions to place state rates on a parity with the increased rates authorized by the Interstate Commerce Commission. The California Railroad Commission was asked to join with the other state commissions in a presentation of its views on the matter, but it did not do so as time and distance did not permit of the receipt and study of the proposed presentation by other states. On this point the California Commission says:

> However, to whatever extent the views of this commission may differ from the views of those state commissions which refused to adopt the increases granted by the Interstate Commerce Commission, we desire to emphasize complete agreement and accord with any and all state commissions in so far and to the extent that such commissions defend the legal right of state commissions to determine, fix and establish reasonable rates for intrastate business. To that extent it is this commission's desire to adopt and stand with all other state commissions entertaining similar views.

Wants More in Grand Rapids

To meet the demands of its employees for an increase in wages the Grand Rapids (Mich.) Railway has applied to the Grand Rapids City Commission for an advance in fare. The company has offered its carmen a maimum of 60 cents an hour, but will be unable to pay at this rate unless fares are raised. No specific fare is mentioned in the petition to the city authorities, who are asked to determine a just and reasonable rate. The present fare is 7 cents cash with sixteen tickets for $1.

The company submits figures to show that since April, 1918, a total deficit of $212,992 has accrued, with a total surplus of $8,878, making a net deficit of $204,112. In July, 1920, the deficit was $5,446. In August it was $2,455. The deficit for the month of September amounted to $8,982. This was in spite of the fact that receipts were the largest of any month in the company's history. The petition says in part:

> Our motormen and conductors in August made demands for a greatly increased wage as compared with the 51-cent maximum rate which was being paid them at the time we previously asked for the increased rate of fare. We offered them an increase of 9 cents per hour or a maximum of 60 cents per hour for employees who had been in the service one year or more. Part of our employees have accepted this rate but the majority have asked for an arbitration in the matter, claiming they should have a still higher scale.
>
> At the 60-cent maximum rates our operating expenses will be increased approximately $10,000 per month. We expect that during the ensuing year we will have to pay nearly, if not quite, this 60-cent maximum rate, and will have to have the revenue necessary to meet it. Had we been operating during the past month at the wage rate in effect previous to Sept. 1, our operating report, instead of showing a loss of $8,982, would have showed a gain of $1,266. For each 1 cent per hour of increase in wages our operating expenses are increased approximately $1,000 per month.
>
> You of course know that for the past two years we have not attempted to get a rate of fare which would yield us a profit, but one merely which would permit us to pay expenses. The last dividend payment on our preferred stock was made Oct. 31, 1918, and the last dividend payment on our common stock was made March 1, 1918.
>
> Under the existing conditions we feel that we must have an increase of fare to take care of the increase in wages already agreed to. . . .

Save Your Money—Use the Trolley

A handy timetable for patrons of the electric railway in Mount Vernon and New Rochelle, N. Y., is a booklet, entitled "Hello, Fred, How Is the Bus Running?" It is published by the Westchester Electric Railway. Passengers who ask for one and take it along with them on their ride to Tuckahoe or Pelham and read it will most certainly be playing the "glad game" thereafter.

The booklet is entertaining and instructive and points a moral, too. Especially will it be of value to the car rider who always complains about poor service. Let him read of the woes of Friend Fred, owner of an auto who, in an accommodating way, gave a lift to nine persons one morning all in a hurry to get to the railroad station; of the subsequent catastrophe to two "shoes" costing about $90 as contrasted with a cost of 45 cents on the trolley (even if he had been wildly extravagant and paid all nine fares); of Fred's resolve to give up his car and take advantage of the comfortable, fast and cheap electric railway service provided for him.

Then, too, the little book gives real information about automobile expenses that should be of value to the auto aspirant. As Fred says, "It's a Wise Guy Who Knows What Becomes of His Money."

Transportation News Notes

Suburban Rate Doubled.—The Idaho Public Utilities Commission has authorized the Boise Valley Traction Company, Boise, to raise the fare on its Hillcrest loop line from 5 cents to 10 cents. The company has applied to the commission for an increase in fare on two other lines.

City Will Run Buses—The City Council of Pottsville, Pa., has voted to establish a line of motor buses between Pottsville and Yorkville in competition with the line of the Eastern Pennsylvania Railways. A 5-cent fare will be charged. The railway charges a 10-cent fare between the two towns.

Want More in Tuscaloosa.—Officials of the Tuscaloosa Railway & Utilities Company, Tuscaloosa, Ala., have announced that they will apply to the Alabama Public Service Commission for an increase in the fare charged on the company's railway line from 6 cents to 7 cents. The company will also ask for an advance in gas and power rates.

Would Raise Pittsfield Rate.—The Berkshire Street Railway, Pittsfield, Mass., has petitioned the State Department of Public Utilities for permission to raise its fare from 5 cents to 6 cents. The increase is made necessary by the advance in wages recently granted the company's employees as a means of ending the strike which tied up service on its lines some time ago.

Minimum Fare Eight Cents.—The Denver & Interurban Railroad and the Denver & Intermountain Railroad, Denver, Col., recently increased their rates for both passenger and freight service. Under their new schedule, the minimum fare on the lines of both companies is raised from 7 cents to 8 cents. The fare between Denver and Golden has been advanced from 28 cents to 48 cents.

Higher Freight Rates Asked.—An increase of approximately 40 per cent in express and freight rates is asked by the Indianapolis & Cincinnati Traction Company, Indianapolis, Ind., in a petition which the company recently filed with the State Public Service Commission. The petition asks that the new rates be 150 per cent of the first-class freight rates now in effect for electric railways in Indiana.

Court May Pass on Rate Powers.—The Illinois Public Utilities Commission has announced that if necessary, it will bring to the United States Supreme Court the issue of State jurisdiction over intrastate rates. The commission recently issued an order granting an increase of 33⅓ per cent in freight rates as against the increase allowed by the Interstate Commerce Commission. It has since amended this order so as to allow an increase of 35 per cent on intrastate traffic.

Buses for Abandoned Routes.—The Board of Estimate and Apportionment of New York City has directed Commissioner Grover A. Whalen of the Department of Plant and Structures to establish bus lines over routes of the Brooklyn Rapid Transit Company's surface lines which have not been in operation since the recent strike began. Operation of these lines, nine in all, was discontinued by the company at the direction of Federal Judge Julius M. Mayer.

City Fights Fare Rise.—Steps have been taken by the city of Reading, Pa., to prevent the Reading Transit & Light Company from raising its fare on its local line from 6 cents to 8 cents. The company recently announced that effective Oct. 27 it would begin charging 8-cent fares on its city lines and 9 cents in each zone on its suburban lines. The railway has since offered to compromise the dispute by selling four tickets for 30 cents. The city is still contesting the increase in fare from 5 cents to 6 cents two years ago.

Jitneys Prohibited in Denver.—The emergency jitney service in Denver, which has been in operation since Aug. 1 because of the strike of the employees of the Denver Tramway, was suspended on Oct. 5. Manager of Safety and Excise F. M. Downer declared that although many drivers had ceased to operate buses since the strike settlement there were between 200 and 300 jitneys in operation when the order was given. During the strike the jitney men were permitted to drive buses in Denver without license or restriction.

Seven Cents in Fort Worth.—The Northern Texas Traction Company, Fort Worth, Texas, recently announced that it would increase its fares in Fort Worth from 6 cents to 7 cents, effective Oct. 22. Fares were raised from 5 cents to 6 cents on May 1 of this year. The City Commission of Fort Worth has ordered an investigation of earnings to ascertain if the second increase is justified. The company's franchise does not limit the fares to be charged. If investigation shows that earnings are now adequate, injunction to restrain 7-cent fares will be sought.

Fare Increase Enjoined. — Judge George L. Bell has issued a temporary injunction restraining the Georgia Railway & Power Company, Atlanta, Ga., from raising the fare on its lines in College Park. The company had announced its intention of raising the fare from 5 cents to 7 cents, beginning Oct. 20. The city in asking an injunction, contended that the company's franchise limited the fare to 5 cents. The company was refused an increase on its lines in College Park and Decatur in the recent order of the State Railroad Commission in which an increase in fare from 5 cents to 7 cents on the Atlanta city lines was authorized.

City Favors One-man Cars.—W. C. Culkins, Street Railway Director of Cincinnati, Ohio, has arranged for a survey of the city's traction situation with a view to the adoption of one-man safety cars by the Cincinnati Traction Company. Mr. Culkins recently decleared that the one-man car "was the most important advance in electric traction development for a long time," and that the greatest obstacle to the use of such a car in Cincinnati was the double trolley system. This announcement was made in connection with the installation of several "safeties" by the Cincinnati, Milford & Blanchester Traction Company on its lines in the city.

City Must Make Complaint More Definite.—The Supreme Court of Wisconsin held on Oct. 19 that the city of Milwaukee must make more definite its complaint against the orders of the Wisconsin Railroad Commission granting the Milwaukee Electric Railway & Light Company an increase in its rates of fare. The Wisconsin Railroad Commission had permitted increases in fares in the city of Milwaukee. The city brought an action in the Circuit Court of Dane County for a review of this order. The railway then asked the court to compel the city to make its complaint more definite. This the court did and from this ruling the city appealed to the Supreme Court of the State. The Supreme Court held that the city could not appeal in this case.

Commission Lacks Rate Power.—The New York Court of Appeals has denied the motion made on behalf of Lindley M. Garrison, receiver of the Brooklyn Rapid Transit Company, for a re-argument concerning the right of the Public Service Commission to permit the company to raise the fare on its surface lines to 8 cents. The decision of the court stands, that the commission has no jurisdiction over the fare when the fare is stated in the franchises. The court held that the fare could not be increased without the consent of the Board of Estimate. The Appellate Division of the Supreme Court will listen early next month to arguments on the jurisdiction of the commission over fares on the rapid transit lines. An order by the commission states that it is without jurisdiction and the court action is to dispose of the question finally.

Eight Cents in Santa Barbara.—The Santa Barbara & Suburban Railway, Santa Barbara, Cal., has been authorized by the State Railroad Commission to raise its cash fare from 5 cents to 8 cents. The company has been directed to sell five tickets for 35 cents. The City Council recently made concessions in the matter of service furnished by the company, and the commission recommends that the latter take advantage of this permission to curtail its operating costs. The introduction of one-man safety cars on the Santa Barbara lines is also recommended by the commission, which holds that the system is efficiently operated. The railway has never paid a dividend, has been operating at a steady deficit since 1914, and since 1916 has failed to earn operating expenses. It is capitalized at $899,000.

Court Sustains Nickel Fare.—Interpreting the franchise of the Toledo, Bowling Green & Southern Traction Company, Findlay, Ohio, Common Pleas Judge William F. Duncan recently held that the twenty-five-year grant, obtained in 1915, limited fares to 5 cents for all purposes. Ten-cent charges in some instances had been collected by the company. A ruling also was handed down by Judge Duncan overturning a decision of the Council five years ago ordering the company to move its North Main Street tracks from the side to the center of the street. Judge Duncan held that the present Council has full authority to deal with the matter of tracks. The Council recently repealed an ordinance granting the company a 10-cent fare. The railway has applied to the State Public Utilities Commission for authority to cease operation.

Merchants Combat High Fares.—Merchants doing business in Quincy, Mass., have formed an organization to protest and possibly to take action against the present fares on the Eastern Massachusetts Street Railway. The movement is headed by Col. Henry L. Kincaide, who has declared that unless a cheaper rate can be given by the company he will advocate abolition of all car service in Quincy and the installation of jitneys. He believes the 5-cent zone system could be replaced. At present there is a 10-cent zone system in the city, the fare for a ride from one side of the city to the other being 20 cents. From Quincy Square it costs 20 cents to go to South Braintree, 15 cents to Braintree, 20 cents to East Weymouth and 30 cents to South Weymouth. The merchants who are now protesting declare the high fares are seriously affecting both the city and the suburban business.

Holds "Safeties" Violate Law.—The operation of one-man safety cars in Texas constitutes a violation of the State "Jim Crow" law requiring separate cars or separate sections of cars for negro passengers, according to Homer Stephenson, city prosecutor of the city of Houston. Mr. Stephenson, in moving to dismiss a case involving alleged violation of the "Jim Crow" law on the part of a passenger, explained that the State law provides that there can be no violation until the conductor of the train or car shall request the passenger to take a seat in the proper compartment or section and the passenger refuses to comply. Mr. Stephenson said there is no conductor on the one-man cars and hence there can be no violation of the "Jim Crow" law on such cars, and he concludes that the operation of such cars then constitutes a violation of the "Jim Crow" law. A number of "safeties" were recently placed in service on the lines of the Houston Traction Company. Additional cars will soon be in operation.

Legal Notes

FEDERAL COURTS—*Separate Coach Law Held Not Interference with Interstate Commerce as Applied to Particular Road.*

A Kentucky statute requiring railroads to furnish separate coaches for white and colored passengers is not an unconstitutional interference with interstate commerce, as applied to an interurban railway whose termini and stations are all in the State of Kentucky, though it is operated by another Kentucky corporation, whose lines extend into Ohio, and carries passengers for a single fare and without change from points on the first road into the State of Ohio. [South Covington & Cincinnati Street Railway Company vs. Commonwealth of Kentucky, 40 Supreme Court Rep. 378.]

INDIANA—*Company Held Liable to Trespasser for Defective Electric Wire.*

If an improperly insulated wire passing through the branches of a small tree on private property was obviously dangerous to persons coming in contact therewith, and if the electric company should reasonably have anticipated that children in their play would climb into the tree, then the company is liable for injuries to a child climbing into the tree, though the child was a trespasser. [Fort Wayne & Northern Indiana Traction Company vs. Stark, 127 Northeastern Rep., 460.]

LOUISIANA—*Last Clear Chance Does Not Apply to a Man Walking on Track*

Where a man in full possession of his faculties was walking on a railroad track and was struck and killed by a train, the doctrine of last clear chance does not apply, since his negligence continued up to the moment of the accident, and his chance of seeing the train and getting out of the way was as good as that of the motorman seeing him in time to avoid running him down. [Hudson vs. New Orleans Railway & Light Company, 84 Southern Rep., 492.]

MICHIGAN—*Legislature Cannot Divest Itself of Right to Fix Reasonable Rates*

Rate Act, Sec. 2, fixing the rates which passenger carriers may charge, is not invalid because the rates prescribed by municipal franchises were increased without the consent of the municipality affected, since the Legislature cannot divest itself of the right to reassume and exercise powers granted it by the constitution, among which is the power to fix reasonable rates. [Groesbeck, Attorney General, vs. Detroit United Railway, 117 Northwestern Rep., 727.]

MISSISSIPPI—*City Held Not Liable for Death of Driver of Motorcycle from Collision with Guy Wire Posts.*

Where a municipal street was 37 ft. wide and 17.7 ft. of this width was in good condition for vehicles, and where an electric railway had been authorized to set poles between the travelway and the sidewalk about 3½ feet from the outer limits of the travelway, neither company nor city is liable for the death of the driver of a motorcycle who was killed while running his cycle at a high speed and collided with a pole. [Gulfport & Mississippi Coast Traction Company, et al., vs. Manuel, et al., 85 Southern Rep., 308.]

MISSOURI—*Risk of Falling Into Unlighted Pit Held Not Assumed by a Car Cleaner.*

A car cleaner working in a carhouse did not assume the risk of injury by falling into a pit which the master had negligently failed to light, although he knew of its presence and the failure to light. [Haggard vs. Southwest Missouri Railway, 220 Southwestern Rep., 22.]

NEW YORK—*Lessee of News-stands Held To Be Invitee and Not Mere Licensee.*

The lessee of a news-stand at an entrance of a rapid transit company's subway station and his employee, while on the station platform buying subway tickets in bulk to be resold to customers and others using the entrance, the resale being in fulfillment of the lessor's obligations to the company, were held to be invitees, as to whom the company was bound to exercise ordinary care, and not mere licensees. [Verdini vs. Interborough Rapid Transit Company, 182 New York Supp., 754.]

NEW YORK—*Detective Bureau's Employee, Guarding Cars, Held Not Railway's "Special Employee," Within Compensation Law.*

Where a detective bureau had a contract with a railroad during strike to furnish guards to protect passengers on cars, an employee of the bureau, injured in collision while serving as guard, without knowledge as to whether he was in the employ of the railroad or merely an employee of the bureau, was not a special employee of the railroad within Workmen's Compensation Law so as to prevent him from resorting to a common-law action against the railroad for negligence. [Murray vs. Union Railway of New York City, 127 Northeastern Rep., 907.]

NEW YORK—*Mortgage Provisions as to Sinking Fund Applicable to Bonds Not Issued to General Public.*

Where a tramway company issued bonds secured by deed of trust, stipulating for payments to the sinking fund, and certain of the bonds were delivered to the trustee as custodian, subject to the company's order, and the company on various occasions pledged such bonds as collateral, the sinking fund provisions applied to such bonds as bonds issued and outstanding, though they were not issued to the general public, and the loans for which they were pledged were from time to time paid. [Bankers Trust Company vs. Denver Tramway Company, 183 New York Supp., 326.]

OHIO—*Lessee of Interurban Railway Held Not "Owner in Fee of a Strip of Land by the Side of a Highway."*

The lessee of an interurban railway, which was the grantee by a board of county commissioners of a right-of-way upon and along the side of a public highway, does not thereby become the owner "in fee of a strip of land by the side of a highway" within the contemplation of Sec. 1209, General Code, so that the company becomes liable as abutting property owner for improvements to the street. [Dayton & Troy Electric Railway vs. Scott, treasurer, et al., 126 Northeastern Rep., 879.]

PENNSYLVANIA—*Pedestrian Contributorily Negligent in Stepping on Track Without Looking.*

A pedestrian's failure to look immediately before stepping on the track of a street railway is negligence per se and bars recovery, although he looked before stepping from the sidewalk to cross the street to take the approaching car and although the approaching car did not slow down according to law at the cross street and stop for passengers as was customary. Where there is no evidence upon the subject the presumption is that a pedestrian crossing a street railway track looked immediately before stepping upon the track to see whether a car was approaching. [Griffith vs. Philadelphia Rapid Transit Company, 110 Atlantic Rep., 76.]

TEXAS—*Derailment Raises Presumption of Carrier's Negligence.*

In a passenger's action for injuries sustained by exposure when compelled to walk four miles to a town after a derailment of the car wherein he was riding, where the allegations of negligence were general, the rule of the presumptive negligence from the fact of derailment obtained, and, to overcome such prima facie case of negligence, it was necessary for the company to show that the accident could not have been avoided by the exercise of the utmost care reasonably compatible with the prosecution of its business. [Dowdy vs. Southern Traction Company, 219 Southwestern Rep., 1092.]

WISCONSIN—*Surrender of Franchise and Acceptance of Indeterminate Permit Held Not to Relieve Company of Payment for Using Streets.*

An interurban railway surrendered its franchise for an indeterminate permit, as authorized by a State law, but this surrender was held not to relieve the company of an obligation under its former franchise to pay $1,000 a year for the use of the streets of the city which gave the original franchise. [City of Oshkosh vs. Eastern Wisconsin Electric Company, 178 Northwestern Rep., 308.]

Personal Mention

London's Motor Managers

Authors of Paper Before A. E. R. A. Convention Pioneers in Their Respective Fields

Frank C. Pick and George J. Shave, the authors of the paper "The Motor Bus in Urban Transportation," presented at the Atlantic City convention, modestly said of themselves in that paper by way of identification that they were "engaged in the management of motor omnibus service in Greater London." That was a typical British statement, but it does not satisfy the curiosity of the American reader of the paper, particularly when the magnitude is considered of the undertaking with which Messrs. Pick and Shave are connected and proper weight is given to the value of the information contained in their discourse.

F. C. PICK

Neither does the meager fact satisfy that was mentioned in the foot-note to the paper that Mr. Pick is commercial manager of the London General Omnibus Company, Ltd., and that Mr. Shave is manager of maintenance of that undertaking. It may be, as Messrs. Pick and Shave said, that the abstract problem of the place of the motor bus in transportation appears simple as A, B, C, but that is only because the authors have solved the problem. And a tremendous one it was, with a possible significant lesson for America.

If any man can be said truly to understand the meaning and application of the phrase "selling transportation" it is Frank Pick. His very title, commercial manager, is unique in the nomenclature of electric railway transportation. It is Mr. Pick who has been the moving spirit under his famous chief, Lord Ashfield, in developing means of attractive publicity and aids to the traveler that have made the fame of London's T. O. T. (Tube-Omnibus-Tram) journey around the world. Upon his return from government service in coal control, Mr. Pick at once plunged into a maze of official hearings on fares and the place of each class of transport facility in London; but his amazing knowledge of London's complex traffic has enabled him to run the gantlet of prolix parliamentary procedure without losing his good humor or his memory.

Particularly during the long-drawn-out years of the war did Mr. Shave have a most unenviable task. Early in the struggle the government took over hundreds of buses for war service and throughout the war Mr. Shave found himself with a personnel so diminished that it was a problem to keep the remaining buses going, let alone build new ones for enormously increased traffic. With the coming of peace, however, Mr. Shave and his confrères have turned their thoughts to the development of larger and still better buses, the first result being the new type, "K," a 46-seater and, more recently, a 57-seater significantly referred to by the public as the "Hush-Hush."

C. A. Semrad Heads Colorado Association

C. A. Semrad, general manager of the Western Light & Power Company, Boulder, Col., was elected president of the Colorado Electric Light, Power & Railway Association at the recent meeting of that body in Glenwood Springs.

Mr. Semrad was born on July 3, 1885, at Highland, Wis. He was graduated from the University of Wisconsin, College of Electrical Engineering, in June, 1908. In the following year he served as an instructor in hydraulics and water power at the same institution. He was then employed by the Union Light & Power Company, St. Louis, Mo., for about a year, at the end of which time he became a cadet engineer of the Northern Colorado Power Company. Four years later he was made general manager of the Cheyenne, Wyo., Light, Fuel & Power Company, a subsidiary of the Western Light & Power Company. He subsequenlty became general manager of the latter company.

Herbert Markle Re-elected

Herbert Markle, general manager of the Appalachian Power Company, Bluefield, W. Va., has been re-elected president of the Public Utilities Association of West Virginia. The association is made up of representatives of the electric railway, light and power, artificial gas, water and telephone companies of the State. Mr. Markle has been serving as its president for the past five years.

Mr. Markle is a native of Indiana. Graduating from the School of Electrical Engineering of Purdue University in 1895, he entered the employ of the Jenney Electric Company, Indianapolis. After serving with that organization for several years, he joined the Northern Electric Manufacturing Company as district sales manager, with headquarters at Chicago. For a few months he also served with the Fort Wayne Electric Company after the consolidation of that company with the Northern Electric properties. Eleven years ago he joined the Byllesby organization, and for three years was stationed at Stillwater, Minn., as manager of several properties of the Northern States Power Company. For the past eight years he has been general manager of the Appalachian Power Company, with headquarters in Bluefield. This company, in addition to operating large power installations, owns the electric railway system in Bluefield.

G. J. SHAVE

Bert Dunkin, auditor of the Albia Light & Railway Company, Albia, Iowa, has been appointed acting manager of the company to succeed Ralph W. Boyer, who has resigned to enter another line of business.

Ralph W. Boyer has resigned as general manager of the Albia Light & Railway Company, Albia, Iowa, to enter another line of business. Mr. Boyer has been connected with the company for the past eleven years.

Rolla Wells, receiver of the United Railways of St. Louis, Mo., has been elected president of the Employees' Mutual Benefit Association of the company. The by-laws of the association were amended by unanimous vote of the board of directors to permit of the election of Mr. Wells.

A. L. Gibson has been appointed superintendent of the Lawrence District of the Eastern Massachusetts Street Railway, Boston, Mass. Mr. Gibson started as a uniform man in the Chelsea District of the Bay State System and later became a car foreman. For several years he has been superintendent of the district which includes the lines in western Reading and Wakefield.

Manufactures and the Markets

DISCUSSIONS OF MARKET AND TRADE CONDITIONS FOR THE MANUFACTURER,
SALESMAN AND PURCHASING AGENT
ROLLING STOCK PURCHASES BUSINESS ANNOUNCEMENTS

Demand for Paint Exceeds Production

Electric Railways Not Buying Heavily at Present—Deliveries Improving and Prices Seem Steady

Electric railways have not been buying a large amount of paint recently, according to a survey made among several of the large manufacturers. The general demand for paint on the other hand has all along been very good, with the result that in some cases manufacturers have been as much as four months behind on orders. Several producers are finding the general demand for paint slackening just now, and do not expect it to resume heavily again until spring. Others say that sales are picking up and should continue to increase, especially on behalf of electric traction companies which are repainting much of their old equipment. A feature of this demand is the growing use of enamel on cars.

BRIGHT PROSPECTS FOR 1921 SALES

Without exception paint makers give very optimistic opinions on the prospect for next year's business. Almost no cancellations, it is stated, have been received and great hopes are being based on the return of the building industry in 1921. Electric and steam railways are also expected to buy more heavily. The latter have already greatly increased their requirements since the advent of higher rates, it is said in some quarters.

Little prospect of lower prices in the near future is held out. One producer is shading prices a trifle, it is true, but not officially, and though virtually all the other paint makers think prices have reached their peak, the consensus of opinion seems to be that present levels will be maintained for some time to come. The reason for this is said to be the undersold condition of the market and because raw material in many cases has been contracted for in advance at the old prices. No reduction is noted in the high cost of pigments. On the other hand, turpentine and linseed oil have eased off in price, and one of the largest paint manufacturers thinks that if this trend of raw material should continue and labor costs be reduced lower prices will prevail.

Paint ingredients are in good supply but some complaint is heard of not being able to obtain sufficient quantities when needed. There is a scarcity of tin cans, according to one representative manufacturer, and this is said to be due to an inadequate tin plate supply. Stocks of the finished product in many cases are low owing to the heavy demand this year, though one or two manufacturers report a good supply. The next few months are counted on to replenish stocks so that all supplies should be in good shape to meet the spring demand. Production is very generally up to full capacity and the labor situation in the industry is favorable. As a result, deliveries are improving in several instances, and producers who have been far behind on filling orders are now catching up. One representative company is able to fill orders for paint from stock, but in general deliveries range from about two to six weeks.

Steady Prices for Trolley Rope Prevail

Good Demand Exists — Current Requirements Handled Readily Despite Inability of Factories to Accumulate Stocks—Opportunity for Standardization of Sizes Seen

Trolley rope continues in steady demand, according to representative manufacturers. A leading maker of this material recently reported to a representative of the ELECTRIC RAILWAY JOURNAL that his orders have shown a steady increase during the past half year. Another manufacturer stated that the volume of business is holding up exceedingly well, with no falling off in inquiries or purchases. The drop in the price of spot cotton in the general market has not been reflected in any changes in trolley rope quotations as yet.

Purchasers do not appear to expect an immediate downward movement in prices, but it is thought that if the present level of raw material prices is maintained lower quotations will follow after existing stocks of cotton are exhausted.

PRICE TREND NOT CLOSELY DEPENDENT UPON SPOT COTTON

The price of spot cotton, it was stated, is not an accurate barometer of trolley rope quotation possibilities. The long fibered cotton required in the production of this class of rope is very difficult to obtain at present. One leading manufacturer states that he is unable to secure definite delivery dates and prices on this commodity. This class of cotton sells for perhaps 40 to 50 per cent above the spot quotations, and it is pointed out that the number of bales changing hands is a better index of market conditions than the extreme quotations published daily. The minimum prices quoted lately on spot cotton are held by trolley rope manufacturers to be largely speculative. The two controlling factors in the maintenance of present prices appear to be the existence of raw material stocks purchased long ago and the sustained high wages received by labor. There appears to be no downward movement in wages in the rope factories as yet. Long-continued transportation difficulties and increased freight rates have also caused manufacturers considerable anxiety.

Night work is not necessary to meet the present demand, and a tendency toward increased production on the part of labor is noted. Deliveries of trolley rope in quantity are being made on a basis of eight to ten weeks from the receipt of order. There are virtually no factory stocks, although it is the custom in some plants to build up these and maintain them during normal times. Current prices for trolley rope range from about 90 cents to $1.25 per pound according to grade. Some talk of the desirability of cutting down the number of sizes specified by purchasers is heard, although it does not appear to be the plan of the manufacturers to reduce the variety. The $\frac{1}{2}$-in. size is commonly used, and though a good demand exists for the $\frac{15}{32}$ and $\frac{17}{32}$-in. sizes as well, there is a feeling in some quarters that an opportunity for standardization exists which might ultimately lead to quicker deliveries and lower prices.

Credit conditions are said to be fair only. Many orders are paid on a sixty to ninety-day basis notwithstanding their being billed for a thirty-day payment. Register cord is not in heavy demand at present and current quotations on the better grades run around $1.20 per pound. No difficulty is met in handling urgent needs for either trolley rope or bell cord.

Deliveries of Cars for St. Louis Not Much Delayed

St. Louis Car Company declares there is no foundation for the report that there may be six months' delay in the delivery of the cars which it is building for the United Railways of St. Louis because of the recent fire in the St. Louis Car plant. The delay at most will not exceed three months, according to the car company.

Friction Tape Deliveries Improving

Raw Material Plentiful and Production Has Increased, but Demand Is Less—Prices Seem Steady

Accumulation of raw material and increased production, coupled with a moderate falling off in orders has resulted in greatly improved delivery conditions in the friction tape market. A representative manufacturer informed the ELECTRIC RAILWAY JOURNAL a few days ago that he could easily handle orders as large as 50,000 lb. a week, quoting seven to ten days' delivery. Factory stocks are not being built up, however. The price question is the chief obstacle to larger business. The cost of cotton sheeting has eased off somewhat, but the mills are still heavily loaded with orders and no marked tendency toward a sharp decline can be seen in the present price of raw material.

One manufacturer pointed out that no very great price reduction on friction tape is to be expected before January. Wages are maintained at the high level attained some time since and the cost of coal purchased under a $5 contract has increased to $18 and $21 per ton in this plant within a few months. A very heavy demand for rubber hose has set in and tape manufacturers making diversified products are less affected by fluctuations in buying than are producers of a few very limited lines. Tape prices, it is said, are not figured upon the maximum price of cotton sheeting to the manufacturer, and for this reason quite a substantial decrease in raw material cost would be required to have much effect upon the quotations of tape producers. Current prices run from 60 to 70 cents per pound. Recent suggestions as to the desirability of using white and gray tapes have borne good fruit and less than 1 per cent of the tape sold by a large producer is now white. Labor conditions are good and so far it has not been necessary to lay off employees to any extent in this field. Few cancellations are being received.

Rail Bonds Decrease in Price

Softening copper prices are responsible for a reduction in rail bond prices which went into effect about the middle of this month, it is stated. The reduction is slight and corresponds to the price advance made about two months ago. The further trend of prices is uncertain, according to one of the leading factors in this line.

The supply of rail bonds at present is said to be adequate for all needs, especially as demand has lessened recently and raw material is plentiful, it is stated. Deliveries are encompassed within a range of two to three weeks. No cancellations have apparently been received and manufacturers hope for good business to develop from the prospects that are now seen for further electrification of roads. Foreign demand is slightly better at present than has been the case recently, one of the leading manufacturers states, and sales abroad should continue to increase.

At the date of going to press word has just been received of a further drop in rail bond prices. The amount of the reduction, which goes into effect on Oct. 30, is approximately the same as the cut mentioned above.

Sales of Electric Coin-Handling Machines Growing

Increase in Multiple Fares Aids Demand—Raw Material Supply Favorable and Deliveries Are Good

Electrically operated coin handling machines for sorting, counting and wrapping coins of various denominations are coming into increasing favor with electric traction companies. One of the factors promoting their use, besides the saving effected in time, is the elimination of additional employees to handle the money. Another reason for the stronger demand is that with the increased fares that many street railways are securing the number of additional coin denominations involved has brought greater problems in the handling of fares, with a consequent trend toward machine sorting, counting, etc.

With the increase in demand from electric railways and a favorable volume of orders from other interests, manufacturers are very generally finding it necessary to increase their production. Except for some complaint on the item of castings little trouble is being found with the supply of raw material. There is a scarcity of the wrappers used for wrapping coins, however, according to one of the large manufacturers. This is caused by inability to obtain paper. The small motors used in these machines are now said to be in plentiful supply.

Stocks are not usually accumulated, it is stated, except of partially assembled units. This is because the filling of orders depends upon the coin units that are to be handled in each case. Deliveries, however, are proceeding satisfactorily. One representative company is able to ship in about ten days. Another concern which specializes on a more complicated device for sorting, counting and wrapping coins in one operation can fill orders in about a month. The use of metal tokens by many lines has somewhat complicated the situation where machines for handling coins alone have been devised. This factor has already been provided for in some instances, and will be taken care of soon in others, it is stated.

Prices in this line have reached their peak and will probably hold steady for some time, according to a representative manufacturer. On the other hand, another producer announces an increase in price of about 9 per cent to become effective on its products Nov. 1. The reason for this is said to be the fact that no advances had previously been made covering the period of rising costs of labor and raw material. Labor conditions are improving.

Coal Situation Easing Up

With coal production running well over 12,000,000 tons weekly, and with indications pointing to a suspension of the lake priority order, it is believed that coal will be obtainable in ample quantities in the very near future. There is great congestion at lower lake ports, due to the fact that the saturation point seems to have been reached in the Northwest. This condition promises to make available within the next few days some four thousand additional cars of coal daily. Once this amount of coal is added to the distribution in the so-called lake territory and in the East it is believed that public utilities will have little further difficulty in securing their coal.

Since the new service order, it is reported by the national committee on gas and electric service, there has been no single case in which an emergency has been met with assigned cars. If a utility runs short of coal it must now first establish that it cannot secure the coal through ordinary commercial channels. If that is established this committee, through the co-operative agreement existing with the railroads and the National Coal Association, makes arrangements directly with the operator with whom the utility has a contract.

Rolling Stock

The Chicago Surface Lines, on Oct. 26, had received six of the ten standard safety cars ordered from the J. G. Brill Company about Sept. 15.

Puget Sound Power & Light Co., Bellingham, Wash., expects eight new safety cars for its lines to be shipped from St. Louis on Nov. 2, it is announced.

Berkshire Street Railway Company, Pittsfield, Mass., has secured delivery of nineteen safety cars, it is announced, and will operate on a one-man car basis except on some of the long interurban runs. A few safety cars have already been in operation on the Pittsfield lines for several months. The heavy double-truck cars will be taken off all city lines.

The Detroit (Mich.) Street Railway Commission has called for bids on twenty-five new trolley cars for use on the municipal lines now under construction. The cars specified are to be of the one-man safety type. It is the hope of the city to have the cars delivered before Jan. 1, 1921, so that they can be operated soon after that date if necessary.

Interstate Public Service Company, Indianapolis, Ind., expects completion of the seventeen new freight cars now under construction at the plant of the company at Indianapolis by Nov. 1, according to L. M. Brown, superintendent. The cars will be 39 ft. long, 8 ft. 4 in. wide and will have a capacity of 50,000 lb. The eight new all-steel passenger cars which were to have been delivered last June are now promised by the middle of November and may be in operation a month later, according to Mr. Brown.

Track and Roadway

Houston, Bay Shore & Texas City Traction Company, Houston, Tex.—The Houston, Bay Shore & Texas City Traction Company, incorporated recently with a capital stock of $300,000, has filed with the State Secretary an amendment to its articles of incorporation certifying to an increase in its stock to $1,000,000.

Interstate Public Service Company, Indianapolis, Ind.—The Interstate Public Service Company will make some extensive additions in the maintenance of way department in its plant at Scottsburg, Ind., in the early spring. Among the improvements will be a general shop building and new carhouses. The project will entail an expenditure of approximately $300,000.

Eastern Massachusetts Street Railway, Boston, Mass.—The Department of Public Utilities has notified Mayor Peters that it will authorize a city expenditure of not more than $300,000 for improvement and repair work on the Eastern Massachusetts Street Railway in the Hyde Park section now being operated by the Boston Elevated. The city created a loan fund this year for such expenditures and this will be the first draft.

Detroit (Mich.) Municipal Railway.—The Street Railway Commission of Detroit has awarded a contract for furnishing steel trolley poles to the National Tube Company, Pittsburgh. The company's price for supplying 1,700 30-ft. trolley poles (steel tubes) and 400 30-ft. heavy poles is $151,680.

Phillipsburg (N. J.) Transit Company.—The Phillipsburg Transit Company will place new special work across the Pennsylvania Railroad tracks in Union Square, Phillipsburg.

Phillipsburg (N. J.) Transit Company.—The Phillipsburg Transit Company will expend $20,000 for paving 3½ ft. alongside its tracks for a distance of 3,960 ft. along Main Street, Phillipsburg. The paving will consist of brick set on a concrete base and the contract has been awarded to Korp & Korp, Phillipsburg.

Public Service Railway Company, Trenton, N. J.—A plan to connect Camp Dix with Trenton and other nearby towns was recently discussed by Mayor Frederick W. Donnelly, of Trenton, and Major General Summerall, of the big army cantonment. The scheme under consideration is to build a spur from the camp to connect with the southern division of the Public Service Railway. The plan was suggested by M. D. Warren, traffic manager of the Trenton Chamber of Commerce, who will take up the matter further with the army officials at Camp Dix. Camp Dix is eighteen miles from Trenton.

Staten Island Midland Railway, New York, N. Y.—The property of the Staten Island Midland Railway, which the city will begin to operate on Dec. 1, will need general overhauling according to the Commissioner of Plant and Structures. Repairs will be made to the roadbed, wires and poles.

Power Houses, Shops and Buildings

Public Service Railway, Trenton, N. J.—The new terminal of the Public Service Railway at the Camden, N. J., ferries has been completed and cars are now running around the loops.

Boston (Mass.) Elevated Railway.—The Boston Elevated Railway has built a garage at Broadway and Washington Street, Boston, to house motor wrecking apparatus and emergency motor car and crew.

Trade Notes

G. E. Anderson, formerly assistant eastern sales manager of the Duff Manufacturing Company, Pittsburgh, Pa., has been promoted to southwestern sales manager and placed in charge of the company's new branch office located in the Railway Exchange Building, St. Louis, Mo.

C. W. Hunt Company, Inc., announces the formation of the C. W. Hunt Engineering Corporation, with offices at 143 Liberty Street, New York City, for the purpose of handling all sales entailing engineering in connection with the Hunt products and all engineering services previously performed by the company.

The Ajax Metal Company, Philadelphia, Pa., has issued a new export catalog in two editions, one English and one Spanish, covering all Ajax products from Babbitt metals to car brasses and castings and ingot metal. The text and illustrations are identical in both cases. Copies of either edition will be sent to interested persons.

A. L. Whipple, who was with the Curtain Supply Company, Chicago, as general sales agent, and later became sales manager for Forsyth Brothers Company, Chicago, in 1907, and in 1913 vice-president of the Standard Heating & Ventilating Company, has been appointed representative of the Locomotive Stoker Company, Pittsburgh, Pa., with offices at 50 Church Street, New York City. Mr. Whipple was for several years active on the entertainment committees of both the steam and electric railway annual conventions. Before his connection with the Locomotive Stoker Company he was vice president and acting general manager of the Railway Improvement Company, New York City.

Hugh Pattison has joined the staff of the heavy traction department of the Westinghouse Electric & Manufacturing Company to make special engineering studies under the direction of F. H. Shepard, director of heavy traction. Mr. Pattison has been closely identified with the industry since completing the course in applied electricity at Johns Hopkins University in 1892. Since then he has been associated successively with Frank J. Sprague, Westinghouse, Church, Kerr & Company, George Gibbs and others. Mr. Pattison took an active part in the application of multiple-unit control in Boston and Brooklyn and in the electrification of the Long Island Railroad, the West Jersey & Seashore Railroad and the Pennsylvania Railroad. He is a member of the A. I. E. E., the A. S. C. E. and the A. S. M. E.

The Ackley Brake & Supply Corporation, 50 Church Street, New York, announces the appointment of the Power Equipment Company, Oliver Building, Pittsburgh, Pa., with Charles A. Saints, manager, as agent for the sale of Ackley brakes and G & B mineral oil paint in the territory covered by western Pennsylvania and West Virginia.

Shaw Crane Works, Muskegon, Mich., has made an interesting installation of two Shaw Overhead Wharf Cranes manufactured by them, at pier No. 6, East River, New York City, the N. Y. State Barge Canal Terminal. They are of the overhead type, traveling on tracks above the shed roof with the boom in a vertical position when changing location so that the pier is not obstructed. The cranes carry freight to and from inside the shed in a straight line without swiveling, the outer end of the boom extending 23 ft. 3 in. beyond the edge of the pier and 10 ft. inside the shed when in operation. A light trolley travels along the boom capable of supporting 3,000 lbs. when the latter is at any angle up to 45 degrees.

New Advertising Literature

Cable Joints.—The Standard Underground Cable Company, Pittsburgh, Pa., has issued bulletin No. 740-1, covering cable joints and jointing material.

Copperclad Wire.—Copper Clad Steel Company, Rankin, Pa., is distributing a twenty-three page booklet, entitled "Copperweld Wire," on copper-clad steel wire.

Portable Cranes and Hoists.—The Canton Foundry & Machine Company, Canton, Ohio, is distributing a thirty-four page booklet, covering its portable floor cranes and hoists.

Concrete Poles.—Massey Concrete Products Corporation, Chicago, Ill., is circulating catalog supplement No. 5, an eleven-page booklet which illustrates and describes Massey hollow reinforced concrete poles for telegraph, transmission and trolley lines. Copies may be had on request.

Peacocks Lower the Operating Ratio

The manager who is operating hundreds of cars in daily service with no other brakes than Peacocks, has the same general class of motormen that you do. He has much the same problems that you have but he is saving a lot of money in the operation of those cars. He lives in a town of over 600,000 inhabitants and a town with hills at that. Many of his cars have both air brakes and Peacocks but all have Peacocks. His motormen know their hand brakes are good brakes; they have confidence in them. They are using them every day.

You can have the same conditions on your road if you will, but you must have Peacock Brakes.

Type "G" Peacock

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Ford, Bacon & Davis,
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115 BROADWAY
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RAILWAY, LIGHT and POWER PROPERTIES
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Consultant
FARES AND BUSES
More revenue from *more* riders
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GENERATING UNIT
1—17½ in. x 21½ in. Horizontal Type, Piston Valve, 200 R. P. M. Buckeye Engine, direct connected to a 200 Kw. 2200-Volt, 3 phase, 60-cycle, Westinghouse Generator. For prices and full particulars address:
Mercer County Light, Heat & Power Co.
Greenville, Pa.

"We received
a large number of inquiries regarding this unit, from our ad. and are certainly very much pleased with the results. You may rest assured that when we have any more material to dispose of we will certainly use the Searchlight Section of Power."
Mercer County Light, Heat & Power Co., Greenville, Pa.
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HAVE YOU SOMETHING TO SELL?
The "SEARCHLIGHT" Section can help you find a buyer for it.
For every business want *"Think SEARCHLIGHT First"*
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The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

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Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
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When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

Collier Service

Standards are being kept

Regardless of the great increases in the cost of materials, artwork, printing, labor and other items, users of Collier Service know that its standards are not only being kept, but even surpassed.

No deterioration is permitted in the quality of the car-card stock or printing; nor a lowering of the artistic standards and originality that have made car-card advertising a respected medium with the shrewdest advertisers of America.

And this adherence to a standard of excellence set by ourselves is matched by faithful adherence to our agreements to pay a fixed sum per month promptly to our electric railway clients, with no attempt whatever to claim indulgence for unforeseen changes in economic conditions.

Barron G. Collier
INCORPORATED

Candler Building, New York

What You Really Get

SPECIFICATIONS

— for —

BUTT-TREATING CEDAR POLES

P & H Guaranteed Penetration Process

HEIGHT OF TREATMENT

The butts of all poles shall be treated to the height as set forth in the table below.

PENETRATION RESULT

The sapwood of each and every pole shall be impregnated with the preservative to a depth of one-half inch in every portion of the pole in that area between the plane designated as the height of treatment as set forth in the table below, to a plane one and one-half feet below the standard ground line, unless the sapwood be less than one-half inch in thickness, in which case the impregnation will be to the full depth of the sapwood throughout this area.

PENETRATION TEST

The result shall be determined by making frequent tests with an increment borer, removing thereby a plug taken from this area at a point one foot below the standard ground line. The hole from which this plug is removed will then be sealed with Creosote, after which a creosoted plug will be tightly driven in.

PRESERVATIVE

The preservative shall be a pure coal-tar distillate obtained entirely from coal gas or coke-oven tar and must not contain any admixture of any other tar oil or residue obtained from petroleum or any other source, including coal-gas or coke-oven tar and must conform to the standard specification of the American Wood Preservers Association, and the American Railway Engineers Association for Creosote Oil, and the National Electric Light Association's "A" Specifications covering coal-tar creosote.

Length of Poles	Standard Ground Line	Height of Treatment
16 feet	4 feet	5 feet
18 "	4 "	5 "
20 "	4 "	5½ "
22 "	4½ "	6 "
25 "	5 "	6 "
30 "	5½ "	6½ "
35 "	6 "	7 "
40 "	6 "	7 "
45 "	6½ "	7½ "
50 "	7 "	8 "
55 "	7½ "	8½ "
60 "	8 "	9 "
65 "	8 "	9½ "
70 "	8 "	10 "
75 "	8 "	10 "
80 "	8 "	10 "

Butt-Treated
BY
PAGE & HILL CO.
1920
GUARANTEED
One-Half Inch
PENETRATION

This disc countersunk on the butt-end of every pole Butt-Treated by the P & H Guaranteed Penetration Process is your assurance of one-half inch penetration.

You Really Get This In Place of Uncertain Results

THE specifications for the P & H Guaranteed Penetration Process are not a specified method of Butt-Treatment but are specifications that produce a guaranteed one-half inch penetration result.

The result specifications printed here are not only rigidly carried out, but are also securely backed up by a written guarantee on poles butt-treated by this process. Page & Hill Co. guarantees without qualifications to refund the entire butt-treating price on every pole that does not show the prescribed ½ inch uniform penetration.

This is a radical departure from old methods. Every pole-buyer knows what this means in enabling him to keep down his pole maintenance costs.

Insist on getting the genuine, the P & H Guaranteed Penetration Process. Do not be satisfied with any substitute process.

Full Particulars on Request.

PAGE & HILL CO.
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Originators of the P & H Guaranteed Penetration Process. Producers, manufacturers, and foremost in the Butt-Treatment of Cedar Poles.

Broken motor case.

Broken sections lined up.

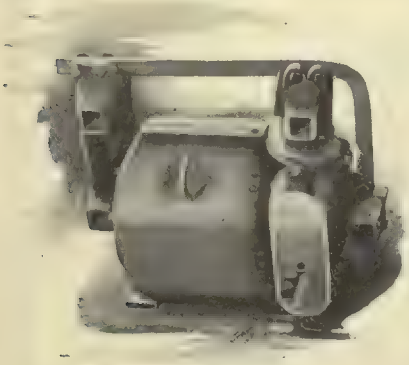
Why Scrap Your Broken Motor Cases When

THERMIT WELDING

will make them as good as new in your own shop?

Less skill required than in electric and oxy-acetylene welding—and you get *reliable results* when the job is finished.

Let us send a man to instruct you in this valuable reclamation work.


Wax Pattern Applied.

The Thermit reactor.

Mold built around broken sections.

Thermit weld, before removing excess metal.

METAL & THERMIT CORPORATION

120 BROADWAY NEW YORK

Pittsburgh Chicago Boston San Francisco Toronto

Thermit weld, after machining.

Chutree

Why do American women wear furs in summer?

For the same reason that the India woman carries a chutree umbrella on a sunshiny day.

The man who can explain the reason is the man who can say "I understand women."

But he doesn't understand women any more than the average operator understands carbon brushes.

He *thinks* he does—but he *doesn't.* There are just as many angles to brush performance as there are to women's doings.

That is why we are impressing on makers and users of motors the urgency of letting Morgan brush engineers *prescribe* Morganite brushes.

They come the nearest to knowing *all* the angles of the brush business—because of their highly specialized experience.

Morganite Brush Co., Inc.

Main Office and Factory: 519 West 38th Street, New York

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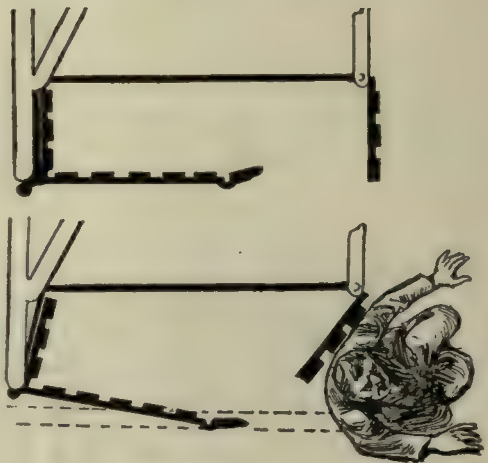
H-B Life Guards on B. R. T.



CAREFUL Inspection of life guards makes their operation positive.

Reduction of accidents by the general use of H-B Life Guards has been responsible for their installation on the largest and best equipped railways in the United States.

Claims brought into court have every chance of being decided in the railway's favor provided it can prove that it has taken the best precaution to prevent front end accidents. H-B Life Guards are ample proof.

The Brooklyn Rapid Transit Company specified H-B Life Guards on its 200 new safeties recently put into operation because it is one of the important factors that make the safety car safe.

Write for details

"Barrier of Safety"
between the fallen pedestrian and the car wheels.

The Consolidated Car Fender Co.
Providence, R. I.

General Sales Agent
Wendell & MacDuffie Co.
61 Broadway, New York

Why the Leading Manufacturers and Operators use SURPACO Coach and Car Surfacer

The chief virtue of SURPACO Surfacer, for coaches and cars, is the particular tenacity of the priming coat—it makes a firm, lasting bond with wood or steel surfaces and forms a most durable groundwork on which to build successive surfacing and finishing coats. SURPACO Surfacer completely fills up all rough places, bolt and nail holes, and provides the smoothest possible surface for finishing work.

It is adaptable to both old and new work and will be furnished to match any color desired. Can be completely applied in 8, 11 and 14 days, according to the system which particular cases find most desirable.

SURPACO Coach and Car Surfacer is a product that fully equals the high quality mark to which all kindred SURPACO products are held, and it will certainly be to your benefit to learn more about it.

Ask us for further particulars, with color cards and directions for our widely used 8-, 11- and 14-day systems. Or, if you have special problems to solve, put them before our Engineering and Advisory Department. Their experience is very valuable—their services cost you nothing.

St. Louis Surfacer & Paint Co.
Hazel and Union Aves.
St. Louis, U. S. A.
Paints for Large Corporation Users Only

START RIGHT WITH SURPACO

The More Stops—the More Need for

BOYERIZED BRAKES

Lamping some accident figures of a big city system, we see that "accidents and damages" totaled 2.1% of gross earnings when they had skip-stops but 3.1% of gross earnings when they didn't have skip-stops.

Don't have to hand you practical railroaders a diagram to prove this line of reasoning.

The more stops, the more use of brakes—
The more use of brakes, the more wear on brake rigging—
The more wear on brake rigging, the more need for

BOYERIZED
Brake Pins and Bushings

to enable you to put that reduction of accident expense into better service and a return on investment instead of slipping it to an over-worked claim department.

To *Boyerize* means to lengthen the life of your equipment and to lower the cost of your upkeep.

Boyerized Brake Hangers.

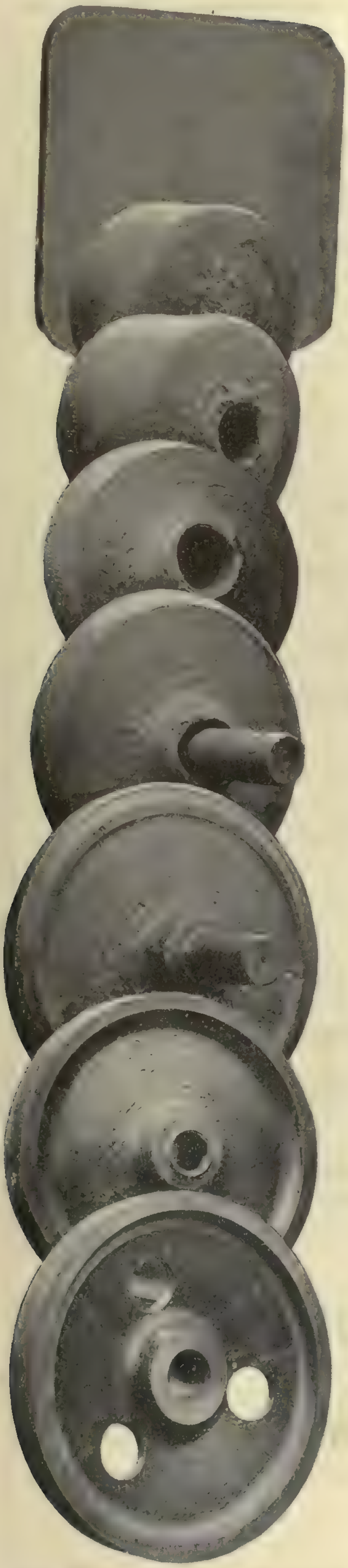
Boyerized Brake Lever Pins and Bushings

Boyerized Wearing Plates between the Bolster and Bolster Carrier.

Boyerized Wearing Plates between the Pedestal Straps and the Journal Box.

Boyerized Pins and Bushings for Door Fixtures.

BEMIS CAR TRUCK COMPANY
Springfield, Mass.



The Reasons Why

Rolled and Forged Circular Sections

made by our special methods should be specified

Told in Five Chapters

CHAPTER 1—INTRODUCTION

Rolling the 22-inch Ingot

Thorough working at proper temperature is one of the most important factors in improving the quality of steel. Our combined rolling and hydraulic forging process subjects the steel to an unusual amount of working.

For example the first operation consists in rolling a 22 x 22-in. ingot into a round bloom 11 in. in diameter thus effecting approximately an 80% reduction in area. This bloom is then hot-sheared into blocks of the size required for the section that is to be made.

A cross-section of the ingot and one of the blocks are illustrated in the first two of the eight scale photographs on this page.

TURBINE BUCKET WHEEL

ROUGH TURNED GEAR BLANK

STREET CAR WHEEL

AUTOMOBILE FLYWHEEL BLANK

SHAFT COUPLING

Uniform Circular Sections

of many kinds can be made by our special methods. A few of these are listed below:

Automobile Flywheel Blanks
Car Wheels
Crane Track Wheels
Gear Blanks
Industrial Wheels
Shaft Coupling Blanks
Turbine Discs

Write for detailed information.
Also watch for next week's advertisement.

Midvale Steel and Ordnance Company
Cambria Steel Company

General Sales Office, Widener Building, Philadelphia, Pa.

District Sales Offices
Atlanta, Boston, Chicago, Cincinnati, Cleveland, Detroit, New York, Philadelphia
Pittsburgh, San Francisco, Salt Lake City, Seattle, St. Louis

Sole Export Representatives
Consolidated Steel Corporation, 165 Broadway, New York
All export inquiries should be sent to this address

"STANDARD"

Steel Tires

Steel Tired Wheels

Solid Rolled Steel Wheels

O. H. Steel and Malleable Iron Castings

Solid Forged Geared Blanks

Steel Forgings Iron Forgings

Forged and Rolled Steel

Pipe Flanges

Ring Dies

Rings

Roll Shells Steel Springs

S BRAND *"The 'Standard' Brand on your material is an assurance of eventual economy."* S BRAND

STANDARD STEEL WORKS CO.

GENERAL OFFICES:

500 NORTH BROAD ST., PHILADELPHIA, PA.

CHICAGO
ST. LOUIS
HAVANA, CUBA

RICHMOND
SAN FRANCISCO
NEW YORK
MONTEREY, MEX.

MEXICO CITY
LONDON, ENGLAND
PARIS, FRANCE

Louisiana

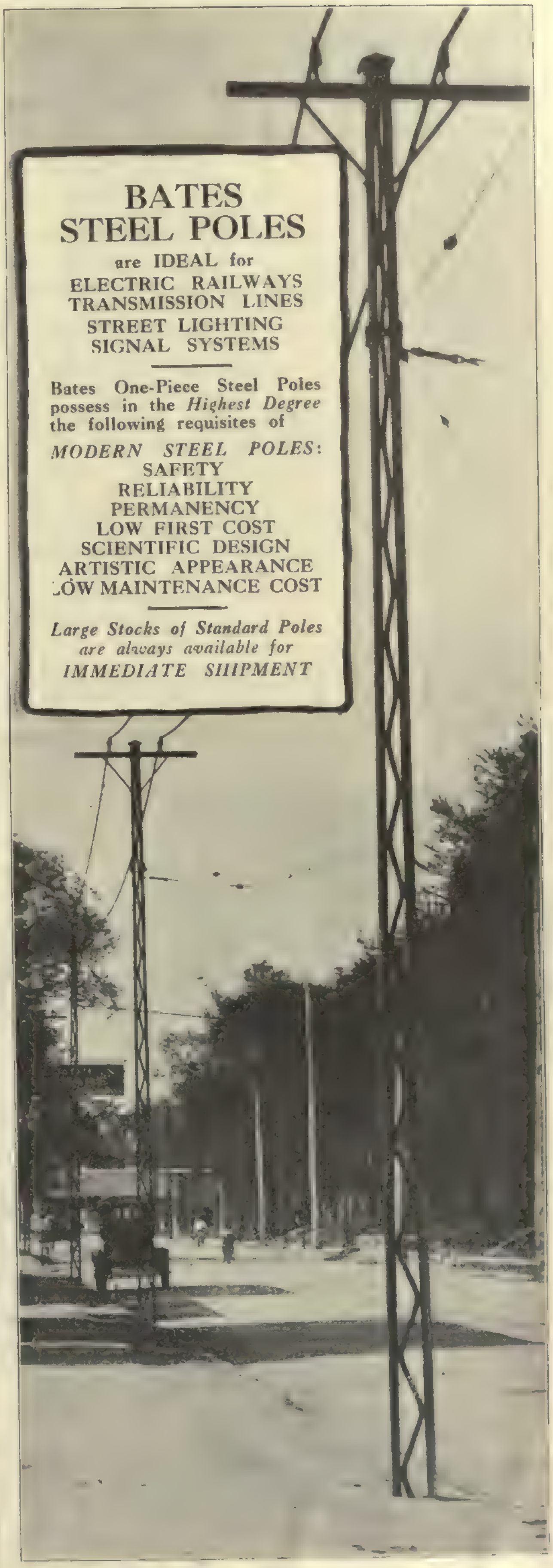
684 Elec. Ry. Cars in La.
of which

663 are controlled by Co's.
which regularly use

"Tool Steel" gears & pinions

$\frac{663}{684} = 96\%$

Watch for your state!



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STEEL POLES
are IDEAL for
ELECTRIC RAILWAYS
TRANSMISSION LINES
STREET LIGHTING
SIGNAL SYSTEMS

Bates One-Piece Steel Poles possess in the *Highest Degree* the following requisites of
MODERN STEEL POLES:
SAFETY
RELIABILITY
PERMANENCY
LOW FIRST COST
SCIENTIFIC DESIGN
ARTISTIC APPEARANCE
LOW MAINTENANCE COST

Large Stocks of Standard Poles are always available for
IMMEDIATE SHIPMENT

Our New 1921 TREATISE AND HANDBOOK sent upon request.

Bates Expanded Steel Truss Co.
208 South La Salle Street
CHICAGO, ILLINOIS

"In the Falling of the Year"—

The old Song puts it for Robin Red Breast. The spirit of preparedness is among all our nature friends. Some that stay with us during the winter are beginning to fur up.

AND WE? — LIKEWISE. Filling the cellar, fixing the furnace, glazing, roofing, painting, mending—all with the same instinctive purpose.

ELECTRIC RAILWAYS TAMBIEN? INDEED YES!—Lots of things to fix up. Coal is high and hard to get and there are lots of holes in the coal bin that lose a big percentage of the fuel.

EVERY OPEN RAIL JOINT OR DEFECTIVE BOND is as wasteful as a broken window, a leaky steam pipe or a worn out faucet

We offer ERICO railbonds—those with a welded terminal—the very best in the market. Our portable apparatus furnishes a rapid and easy means for installing the bonds, requiring a minimum of time and labor. Bonding operations may be carried on where traffic is heaviest without any interference with schedules.

The apparatus is comprehensive in its design. Another function of its usefulness is ARC WELDING.

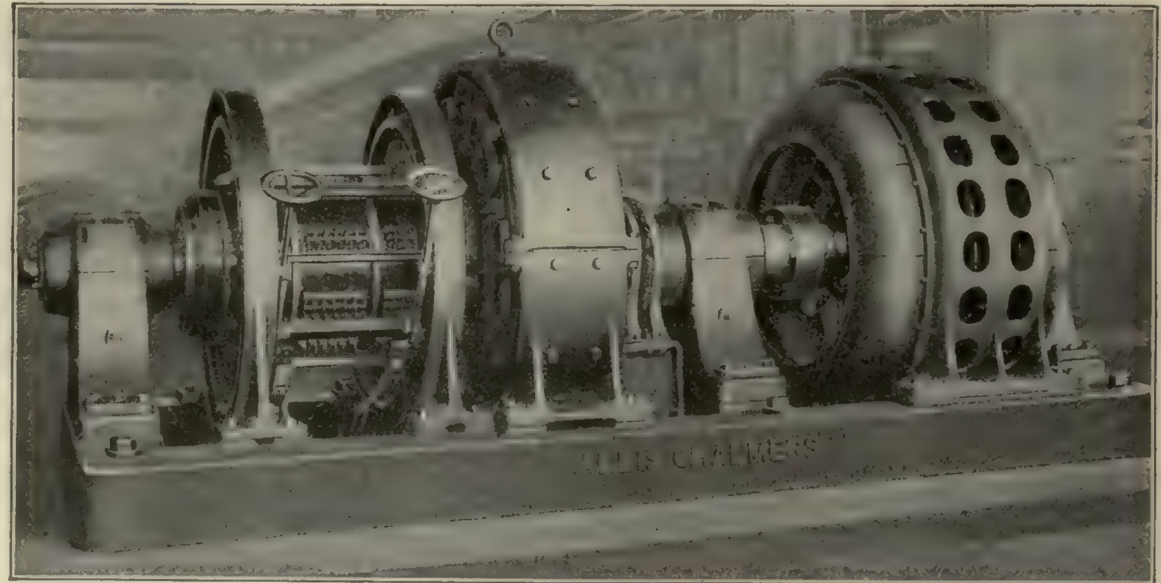
Broken rail ends, worn switches, frogs, guard rails, and cupped joints may be taken care of by the bonding gang, and when the outside work is done the apparatus may be used for shop welding.

Let us send you details and prices.

The Electric Railway Improvement Co.

Cleveland, Ohio

ALLIS-CHALMERS MOTOR-GENERATOR SETS FOR ALL CLASSES OF SERVICE IN ANY CAPACITY



ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
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Hydraulic Turbines
Crushing and Cement Machinery
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ALLIS CHALMERS
MANUFACTURING COMPANY
Milwaukee, Wisconsin, U. S. A.
District Offices in All Leading Cities

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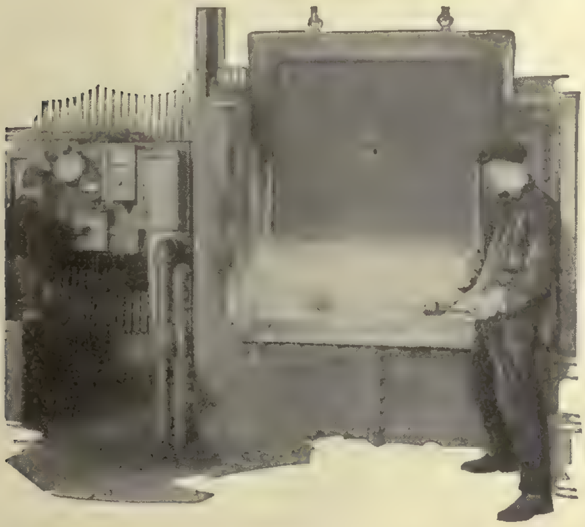
Nuttall Helical Gears

A PROVEN SUCCESS

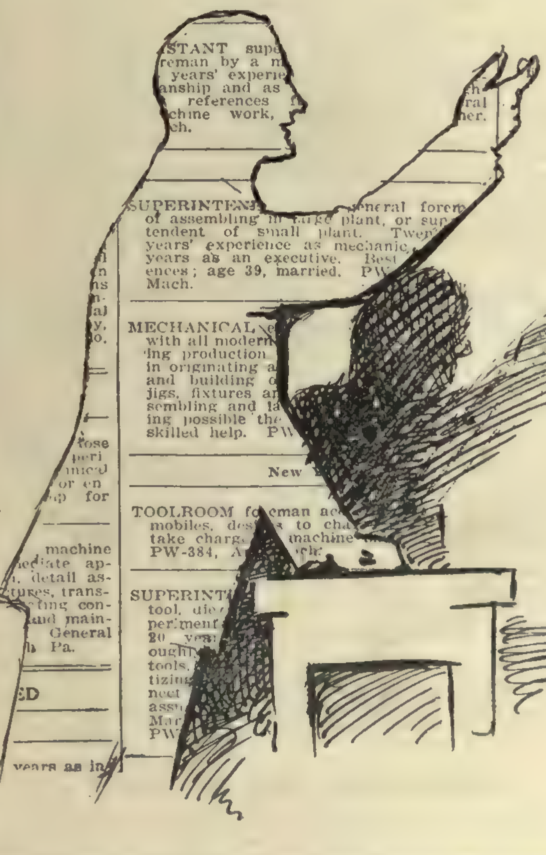


Something else besides mechanical excellence and human skill is included in Nuttall Gears.

Modern apparatus and high grade workmanship are back of every other gear manufacturer who is willing to pay the price for them.

The "something else" that gives Nuttall gears an exclusive quality is the BP treatment, because all Nuttall BP treated gears are guaranteed for *four times the life* of untreated cast steel gears in identical service. Long life results in ultimate economy.

R.D.NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA



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They go direct to those in the industry you wish to reach and tell your story in a forceful and business-like way.

They don't mince words but get right to the point.

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Agents Wanted
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Bids Wanted
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For Every Business Want
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We make quality goods.

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WELDING WIRE WIRE STRAND
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A Copper Conductor with the Strength of Steel.

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Copperweld Wire is 60% stronger than solid copper wire, is 7% to 10% lighter, costs less per pound, lasts 3 to 4 times longer, and therefore is ideal for electric railway service. Write for catalogue No. 22.

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(Round, Grooved or Figure 8)
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Americanite Rubber Covered Wire Incandescent Lamp Cord
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AMERICAN ELECTRICAL WORKS
Phillipsdale, R. I.

Boston, 176 Federal; Chicago, 112 W. Adams; Cincinnati, Traction Bldg.; New York, 233 B'way; San Francisco, 612 Howard; Seattle, 100 1st Ave. So.

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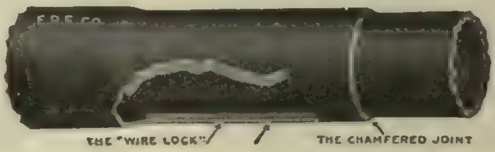

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Lowest Cost Lightest Weight
Least Maintenance Greatest Adaptability

Catalog complete with engineering data sent on request.

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Transmission Line and Special Crossing Structures, Catenary Bridges

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Third Rail Insulators, Trolley Bases, Harps and Wheels, Bronze and Malleable Iron Frogs, Crossings, Section Insulators, Section Switches.

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U. S. Electric Contact Signals
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Single-track block-signal protection
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Protection at intersections with wyes
Proceed signals in street reconstruction work

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General Sales Office and Works: Lackawanna, N. Y.
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SWITCHES—MATES—FROGS—CROSSINGS
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IMPROVED ANTI-KICK BIG-HEEL SWITCHES
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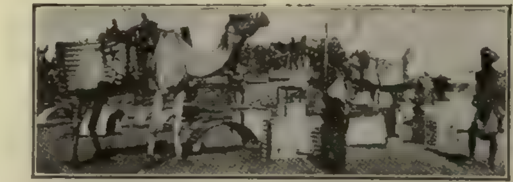

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Anti-Corrosive Corrugated
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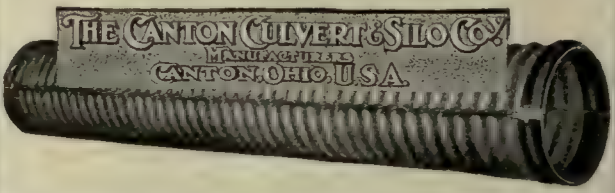
The British Government selected "ACMES" for use in Africa not only because they combined all the desirable features of other culverts, but because they had, in addition an exclusive feature:—*that of being easier to transport.*

This exclusive feature is due to the sectional construction of "ACMES." It is of great value even here in the United States, where culverts must be shipped or hauled any distance.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Plants at Hillburn, N.Y. and Niagara Falls, N.Y. New York Office, 30 Church Street

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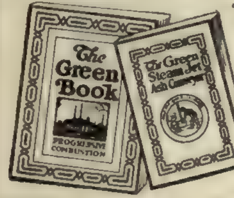

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Atlas

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A fuse that is not merely sold to you but maintained in service thereafter at the lowest cost of any fuse on the market.

Pull down the ferrule and give it a quarter turn, bringing a new fuse element into circuit.

FOOLPROOF—Can be renewed only with self-contained elements, and it is impossible to insert any metallic substance that will render the fuse ineffective.

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600 volt size, showing interior and its separate fuse chambers with patented silencer device.

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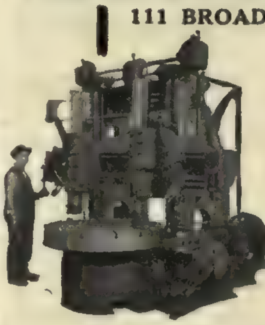

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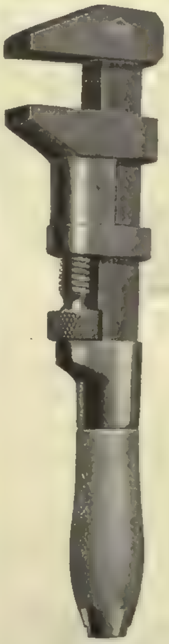

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Electric car heaters—thermostatic control—pneumatic car door operators—buzzers, single-stroke bells, starting signal lights—special resistances.

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Faster than the ticket seller

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Write for THERMOSTATIC CONTROL INFORMATION

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ELECTRIC HEATERS Cut Installation and Maintenance Charge.
VENTILATORS Also Ventilate in Stormy Weather.
THERMOSTATS Save Current.
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ORIGINATED The Ventilated Coil Support.

LET US FIGURE ON YOUR NEXT REQUIREMENTS
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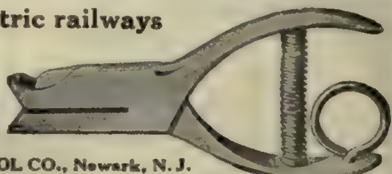

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A Chain Hoist that excels in every feature. It has Planetary Gears, Steel Parts, 3½ to 1 factor of Safety. It's the only Block that carries a five-year guarantee.

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THE TERRY TURBINE
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"Union" Renewable Fuses will save four-fifths of your fuse maintenance cost. Guaranteed to give satisfaction. Money back if they fail. Booklet on request.

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The Cleveland FITS the FARE and FARE COLLECTION SYSTEM. If you have a fare collection problem let us help you.

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Eliminate Accidents

Send for Catalogue No. 18

DREW ELECTRIC & MFG. CO.
Collamer Ave. and Nickel Plate
Railroad, Cleveland, O.

DIFFERENTIAL CAR COMPANY

FINDLAY, OHIO

Compare Them

The faint light of a candle and the strong rays of a searchlight. They represent the comparative efficiency of other ways of finding what you want and advertising for it in the

SEARCHLIGHT SECTION

Employment Equipment Business Opportunities

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Type R-10
Single Register

International Fare Registers. Single registers, round and square; double registers, duplex counters, car fittings, foot-operating devices for single and double registers. Exclusive selling agents for Heeren enamel cap and coat badges.

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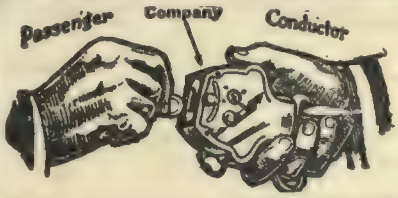
The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD

THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.



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SAMSON CORDAGE WORKS, BOSTON, MASS.

POSITIONS VACANT

EXPERIENCED timetable maker for Eastern city road: Give personal data, experience in detail, references, and state salary desired. P-775, Elec. Ry. Journ.

EXPERIENCED street railway armature winder. Steady work. Address, H. Mcnutt, care San Diego Electric Railway Company, San Diego, Cal., stating age, experience and salary expected.

EXPERIENCED electric and acetylene welder for electric railway work in Eastern city. P-770, Elec. Ry. Journ.

MASTER mechanic wanted for city and interurban property in the East. State age, experience and salary expected. P-771, Elec. Ry. Journ.

SEVERAL draftsmen and computers wanted on frog and switch work with manu- either street or steam railway practice facturer. Experience unnecesary, but desirable. State minimum salary in letter. Steady employment. P-768, Elec. Ry. Journ., Real Estate Trust Bldg., Philadelphia.

SPECIAL work foreman wanted for trolley work construction. State age, experience and salary desired. Location Middlewest. P-772, Elec. Ry. Journ.

POSITIONS WANTED

HIGH-CLASS railway claim agent and safety expert, thoroughly qualified in all branches of claim department management and operation, desires connection with progressive company. PW-767, Elec. Ry. Journ.

700 tons new 9 in.

GIRDER RAIL

Penna Steel Co. section 228, 112 lb. to the yard. Price—$45 per gross ton, f.o.b. cars Brooklyn, N. Y. Subject to R. W. Hunt & Company's inspection.

Prompt shipment.

H. M. FOSTER CO.
Continental Building, Baltimore, Md.

New—Used—Rebuilt

MACHINERY AND SUPPLIES

for construction and industrial work.

READING ENGINEERING CO., INC.
154 Nassau St., New York

FOR SALE

46—GE 67 Armatures.
28—GE 80 Armatures.

First class condition.
Portion newly rewound.

82—new GE-67 and 80 Field Coils impregnated.
10—GE-80 Motor Frames.
112—GE-67 Motor Frames.

Also large quantity new armature bearings, axle bearings, brush holders and yokes. 17 tooth pinions and 67 tooth gears.

TRANSIT EQUIPMENT CO.
501 Fifth Avenue, New York

FOR SALE

16 West. 56 Motors. 4 K-14 Controllers. 4 National type BB-4 Air Brake Equipments complete. 15 Double Truck Cars, 40-ft. long, mounted on Brill Trucks equipped with 4 GE-67 Motors, 2 K-6 Controllers, Air Brakes, etc., complete.

Electric Equipment Co.
Commonwealth Building, Philadelphia, Pa.

POSITIONS WANTED

MANAGER—Position as manager desired. Experience with large properties. Broad education; good address; capable of dealing with public and public officials, and handling laboring men. Good organizer. PW-764, Elec. Ry. Journal, Rialto Bldg., San Francisco.

MASTER mechanic of proven ability, now employed, wishes to make change; 17 years' experience in all departments; Type M and H.L. control; successful in handling labor; A-1 references furnished. PW-774, Elec. Ry. Journ., Real E Trust Bldg., Philadelphia.

SUPERINTENDENT, fully qualified in all departments. Many years' experience in transportation, traffic and mechanical departments; successful in handling labor; now employed, but desirous of making a change. Requests the attention of presidents or managers having vacancies or contemplating changes; excellent references from past and present employers. PW-774, Elec. Ry. Journ., Old Colony Bldg., Chicago.

POSITIONS WANTED

PURCHASING agent, 12 years' experience, age 38, married, college graduate; best references. Would like to have personal interview. PW-769, Elec. Ry. Journ., Real Estate Trust Bldg., Philadelphia.

POSITION wanted: One that will require an effort to make good at. At present in charge of cars and shop equipment on high-speed, high voltage interurban line. Want a road with motor and control trouble; first-class work. State salary first letter. Yours for 100 per cent car efficiency. PW-776, Elec. Ry. Journ., Real Estate Trust Bldg., Philadelphia.

AGENT AND SALESMAN

Manufacturers' Representative Wanted

Who is now selling to railroads or industrial plants and has facilities for actively representing an additional short line that is trade-marked, advertised and guaranteed. Permanent, profitable connection for right man. Address, International Paint Corporation, St. Louis, Mo.

COMPLETE POWER PLANT

FOR SALE

1—500 h.p. Westinghouse Compound Engine, Direct Connected to 550 volt Generator.
2—200 h.p. Harrisburg Engines, Belt Connected to Westinghouse Generators.
1—B & W Boiler, 2 Keeler Boilers, Water Heaters, Pumps, Piping, Switchboards and etc.

All in first class operating condition. Immediate delivery. Make us an offer.

The Lewistown & Reedsville Electric Railway Co., Lewistown, Pa.

NEW
REBUILT **ELECTRIC MOTORS** REWINDING
REPAIRING

NEW A.C. MOTORS ¼ to 5H.P.—LARGE STOCK USED MOTORS
EXCELLANT REPAIR SERVICE ON ANY SIZE OR TYPE

CLEVELAND ARMATURE WORKS, INC.

EST. 1895 **4732-4-6 ST. CLAIR AVE., CLEVELAND, O.** ***INC. 19***

Immediate Shipment

GIRDER RAIL

300 tons 7 in. **girder rail**, located Amityville, New York, also 1000 tons 70 lb. rail, 2000 tons 90 lb. rail. Write or wire for prices quoted.

M. K. FRANK, Pittsburgh, Pa.

5—RY. ROTARIES, 300 KW.
with 25 cy., 3 ph., 15,000 v., Trans and SWBD: $1700.00 each.

1—RY. ROTARY, 400 KW.
3—4,600 v., 60 cy., Trans—600 v., D.C.
Indianapolis, Ind.

ROSS POWER EQUIP. CO.

Machinery in Stock for
Immediate Shipment

ROTARY CONVERTERS

1—300 kw., Westg., 3-phase, 60-cycle, 370-v., A.C., 575-v., D.C., 600 r.p.m.
2—200 kw., G.E., 3-phase, 25-cycle, 85-v., A.C., 125-v., D.C., 8 pole, 375 r.p.m.

FREQUENCY CHANGER SETS

1—600 kva., Allis-Chalmers Frequency Changer Set, 300 r.p.m., 3-phase, 60-cycle, 2300-v. one end, 3-phase, 6600-v., 25-cycle on other end.
1—400 kw., G. E., 3-phase, 25-cycle, 6000-v. one side—2400-v., 2-phase, 60-cycle other side—375 r.p.m.

ARCHER & BALDWIN, INC.
114-118 Liberty Street, New York City
Telephone 4337-4338 Rector

NEW

80 lb. RAIL & ACCESSORIES

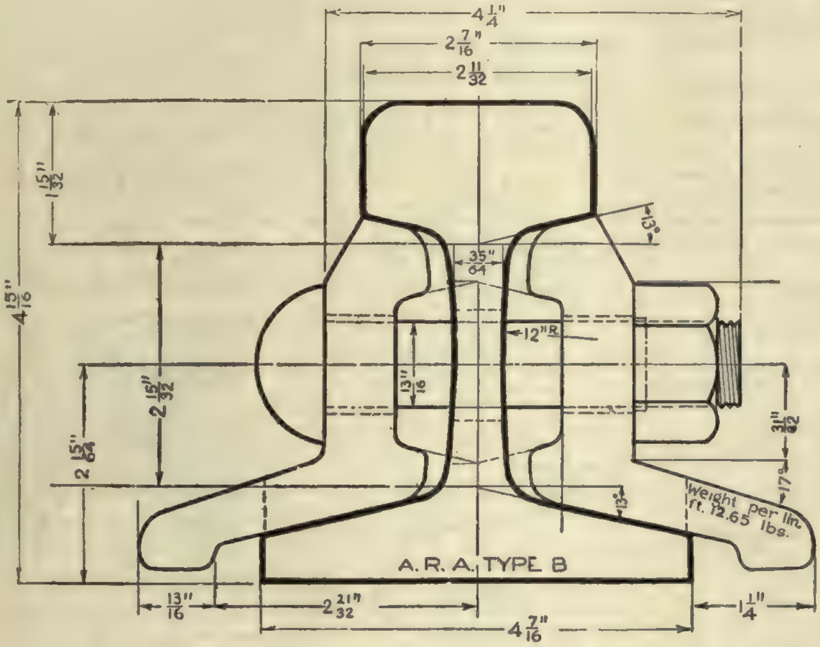
ANGLE BARS, SPIKES, BOLTS AND NUTS COMPLETE

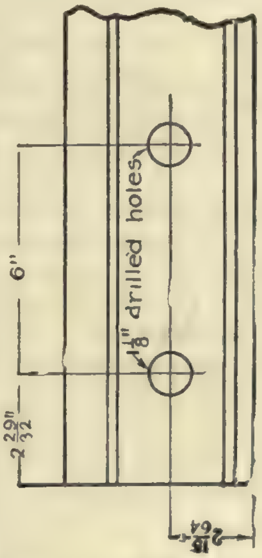
For Sale

A.R.A. "TYPE B" RAIL

Approximately 30,000 gross tons—standard lengths

Stored at Kearney, N. J.





Note actual dimensions of rail stated hereon.

HYMAN-MICHAELS COMPANY

NEW AND RELAYING RAILS

Peoples Gas Building, Chicago, Ill.

New York Office
1324-1326 Woolworth Building

Pittsburgh Office
1312 First National Bank Building

We buy electric and steam railways that are to be dismantled

St. Louis Office
2115 Railway Exchange Building

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.

Air Aftercoolers
Ingersoll-Rand Co.

Air Receivers
Ingersoll-Rand Co.

Ammeters
Weston Electrical Instrument Co.

Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Angle Bars
Lackawanna Steel Co.

Ash Storage Tanks, Cast Iron
Green Engineering Company

Automobiles and Buses
Brill Co., The J. G.

Axles
Bemis Car Truck Co.
Cambria Steel Co.
St. Louis Car Co.

Axle Straighteners
Columbia M. W. & M. I. Co.

Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Standard Steel Works Co.
Westinghouse Elec. & Mfg. Co.

Babbitt Metal
Ajax Metal Co.
More-Jones Brass & Metal Co.

Babbitting Devices
Columbia M. W. & M. I. Co.

Badges and Buttons
Electric Service Supplies Co.
International Register Co., The

Batteries, Dry
National Carbon Co.

Batteries, Storage
Electric Storage Battery Co.
National Carbon Co.

Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
More-Jones Brass & Metal Co.
St. Louis Car Co.
Westinghouse Elec. & Mfg. Co.

Bearings, Center and Roller Side
Stucki Co., A.

Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
St. Louis Car Co.

Benders, Rail
Niles-Bement-Pond Co.

Boilers
Babcock & Wilcox Co.

Bond Testers
American Steel & Wire Co.
Rail Welding & Bonding Co.

Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
Ohio Brass Co.
Rail Welding & Bonding Co.

Bonds, Rail
American Steel & Wire Co.
Copper Clad Steel Co.
Electric Railway Improvement Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & Mfg. Co.

Boring Tools, Car Wheel
Niles-Bement-Pond Co.

Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Expanded Steel Truss Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.

Brake Adjusters
National Ry. Appliance Co.
Westinghouse Traction Brake Co.

Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Brakes, Brake Systems and Brake Parts
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
St. Louis Car Co.
Westinghouse Traction Brake Co.

Bricks, Fire
Green Engineering Co.

Bridges and Buildings
American Bridge Co.

Brooms, Track, Steel or Rattan
Zelnicker, W. A., Supply Co., Inc.

Brushes, Carbon
Corliss Carbon Co.
General Electric Co.
Jeandron, W. J.
Morganite Brush Co., Inc.
United States Graphite Co.
Westinghouse Elec. & Mfg. Co.

Brushes, Graphite
United States Graphite Co.

Brushes, Motor & Generator
National Carbon Co., Inc.

Brushes, Starting and Lighting
National Carbon Co., Inc.

Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.

Bunkers, Coal
American Bridge Co.

Bushings, Case Hardened and Manganese
Bemis Car Truck Co.

Bushings, Graphite and Wooden
Bound Brook Oilless Bearing Co.

Cables (See Wires and Cables)

Carbon Brushes (See Brushes, Carbon)

Carbon, Photographic
National Carbon Co., Inc.

Carbon Projector
National Carbon Co., Inc.

Car Panel Safety Switches
Westinghouse Elec. & Mfg. Co.

Cars, Dump
Differential Car Co.

Cars, Passenger, Freight, Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.

Cars, Second Hand
Electric Equipment Co.

Cars, Self-Propelled
Electric Storage Battery Co.
General Electric Co.

Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Eureka Co.
More-Jones Brass & Metal Co.

Castings, Gray Iron and Steel
American Bridge Co.
American Steel Foundries
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
St. Louis Car Co.

Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.

Catchers and Retrievers, Trolley
Ackley Brake & Supply Corp.
Electric Service Supplies Co.
Ohio Brass Co.
Wood Co., Chas. N.

Caustic Soda Cells
National Carbon Co., Inc.

Ceiling, Car (See Headlining)

Circuit Breakers
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Electric Railway Equipment Co.
Electric Service Supplies Co.
Eureka Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Cleaners and Scrapers—Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.

Clusters and Sockets
General Electric Co.

Coal and Ash Handling (See Conveying and Hoisting Machinery)

Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Coils, Armature and Field
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Coin-Counting Machines
Electric Service Supplies Co.
International Register Co., The
Johnson Fare Box Co.

Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Commutator Truing Devices
General Electric Co.

Commutators or Parts
Cameron Electrical Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Compressors, Air
Allis-Chalmers Mfg. Co.
Chicago Pneumatic Tool Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Trac. Brake Co.

Compressors, Gas
Ingersoll-Rand Co.

Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Schutte & Koerting Co.
Westinghouse Elec. & Mfg. Co.

Conduit Fittings
Chicago Fuse Mfg. Co.

Condulets, or Conduit Fittings
Crouse-Hinds Co.

Connectors, Solderless
Frankel Connector Co.
Westinghouse Elec. & Mfg Co.

Controller Fingers
Russell Mfg. Co.

Controllers or Parts
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Eureka Co.
General Electric Co.
Russell Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Controller Regulators
Elec. Service Supplies Co.

Controlling Systems
General Electric Co.
Westinghouse Elec. & Mfg. Co

Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Conveyors, Belt
Portable Machinery Co

Conveyors, Coal and Ash
Green Eng. Co.
Portable Machinery Co.

Conveyors, Portable
Portable Machinery Co.

Conveying and Hoisting Machinery
Allis-Chalmers Mfg. Co.
Columbia M. W. & M. I. Co.
Green Eng. Co.
Portable Machinery Co.

Copper Wire
Anaconda Copper Mining Co.
Copper Clad Steel Co.

Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roebling's Sons Co., John A.
Samson Cordage Works

Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.

Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Trac. Brake Co

Cranes
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Cross Arms (See Brackets)

Crossing Foundations
International Steel Tie Co

Crossing Signals (See Signals, Crossing)

Crossings, Frog and Switch
Wharton, Jr., & Co., Wm

Crossings, Track (See Track, Special Work)

Culverts
Canton Culvert & Silo Co.

Curtains and Curtain Fxtures
Brill Co., The J. G.
Electric Service Supplies Co
St. Louis Car Co.

Cutouts
Chicago Fuse Mfg Co.

Dealers' Machinery
Archer & Baldwin
Electric Equipment Co.
Foster Co., L. B.
Hyman Michaels Co.

Derailing Devices (See also Track Work)
Cleveland Frog & Crossing Co.
Wharton, Jr., & Co., Wm.

Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.

Detective Service
Wish Service, P. Edward

Dogs, Lathe
Williams & Co., J. H.

Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.

Doors and Door Fixtures
Brill Co., The J. G.
General Electric Co.

Doors, Folding Vestibule
National Pneumatic Co., Inc

Draft Rigging (See Couplers)

Drills, Rock
Ingersoll-Rand Co.

Drills, Track
American Steel & Wire Co.
Chicago Pneumatic Tool Co
Electric Service Supplies Co
Niles-Bement-Pond Co.
Ohio Brass Co.

Drinking Cups, Sanitary Paper
Individual Drinking Cup Co., Inc.

Dryers, Sand
Electric Service Supplies Co.
Zelnicker Supply Co., Inc., Walter A.

Electrical Wires and Cables
American Steel & Wire Co.
Roebling's Sons Co., J. A.

Electrodes
National Carbon Co., Inc.

Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co The
Engel & Hevenor
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jacobs & Co., J. L.
Jackson, Walter
Parsons, Klapp, Brinkerhoff & Douglas
Republic Engineers, Inc.
Richey, Albert S.

Model 341
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One of the Portable Electrodynamometer Group, which also includes Model 310 Single Phase and D.C. Wattmeter, Model 329 Polyphase Wattmeter, and Model 370 A.C. and D.C. Ammeter.

The characterstics of the group are extreme accuracy (guaranteed within one-fourth of 1% of full scale value), adaptability for use on circuits of any commercial frequency and any wave form, great overload capacity, low moment of inertia, effective damping and shielding and the legibility and remarkable uniformity of the hand-calibrated scales.

Comparisons Tell the Story!

Only when you have studied the Instrument question by direct comparisons will you realize fully what a high degree of efficiency and economy you can effect by selecting

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As soon as you inspect them—even before you subject them to the test of comparisons in actual use—the reasons for their acknowledged superiority will be apparent to you. These reasons are revealed in every structural detail.

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Weston Electrical Instrument Company
21 Weston Ave., Newark, N. J.
Branch Offices in Principal Cities of the United States
and Throughout the World

Ajax Perfecto Bronze Check Plates

Made from our Perfecto Bronze — the strongest and toughest metal on the market; will bend before it will break. Withstands shocks therefore, and outlasts all other check plates several times.

Specify Ajax Perfecto Bronze on your next requisition.

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Established 1880
Main Office and Works: **Philadelphia, Pa.**
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The "Hycap-Exide" Battery

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STORAGE BATTERY STREET CARS

THE ELECTRIC STORAGE BATTERY CO
PHILADELPHIA

Le Carbone
Carbon Brushes are uniform. They talk for themselves.

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Robinson & Co., Dwight P.
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Scofield Engineering Co.
Stone & Webster
White Engineering Corp., The J. G.

Engines, Gas, Oil or Steam
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Fare Boxes
Brill Co., The J. G.
Cleveland Fare Box Co.
Johnson Fare Box Co.
National Railway Appliance Co.

Feed Water Heating
Schutte & Koerting Co.

Fences, Woven Wire and Fence Posts
American Steel & Wire Co.

Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Electric Service Supplies Co.

Fibre and Fibre Tubing
Continental Fibre Co.
Westinghouse Elec. & Mfg. Co.

Field Coils (See Coils)

Filters, Water
Scaife & Sons Co., Wm. B.

Fire Extinguishing Apparatus
Castle, Inc., James M.

Flashlights
National Carbon Co., Inc.

Floodlights
Crouse-Hinds Co.
Electric Service Supplies Co.

Flooring Composition
American Mason Safety Tread Co.

Flooring, Grating
Irving Iron Works

Forgings
Columbia M. W. & M. I. Co.
Eureka Co.
Standard Steel Works Co.
Williams & Co., J. H.

Frogs, Track (See Track Work)

Funnel Castings
Wharton, Jr., & Co., Inc., Wm.

Fuses and Fuse Boxes
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Multiple Elec. Products Co.
Westinghouse Elec. & Mfg. Co.
Williams & Co., J. H.

Fuses, Refillable
Chicago Fuse Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.

Gages, Oil and Water
Ohio Brass Co.

Gaskets
Power Specialty Co.
Westinghouse Traction Brake Co.

Gas-Electric Cars
General Electric Co.

Gas Producers
Westinghouse Elec. & Mfg. Co.

Gates, Car
Brill Co., The J. G.

Gear Blanks
Standard Steel Works Co.

Gear Cases
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & Mfg. Co.

Gears and Pinions
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
Tool Steel Gear & Pinion Co.

Generating Sets, Gas-Electric
General Electric Co.

Generators
Allis-Chalmers Mfg. Co.
General Electric
Westinghouse Elec. & Mfg. Co.

Gongs (See Bells and Gongs)

Graphite
Morganite Brush Co., Inc.

Grates, Chain
Green Eng. Co.

Greases (See Lubricants)

Grinders and Grinding Supplies
Metal & Thermit Corp.
Railway Track-work Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Guards, Cattle
American Bridge Co.

WHAT AND WHERE TO BUY

Guards, Trolley
Electric Service Supplies Co.
Ohio Brass Co.

Guy Anchors
Crouse-Hinds Co.

Harps, Trolley
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
More-Jones B. & M. Co.
Nuttall Co., R. D.
Star Brass Works

Headlights
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.

Heaters, Car (Electric)
Consolidated Car Heating Co.
Gold Car Heating & Lighting Co.
National Ry. Appliance Co.
Smith Heater Co., Peter.

Heaters, Car, Hot Air and Water
Cooper Heater Co.
Smith Heater Co., Peter

Heaters, Car (Stove)
Electric Service Supplies Co.
Smith Heater Co., Peter

Hoists and Lifts
Columbia M. W. & M. I. Co.
Ford-Chain Block Co.
Niles-Bement-Pond Co.

Hose
Ingersoll-Rand Co.

Hose, Bridges
Ohio Brass Co.

Hydraulic Machinery
Allis-Chalmers Mfg. Co.
Niles-Bement-Pond Co.

Injectors
Schutte & Koerting Co.

Inspection
Electrical Testing Lab's

Institutions, Educational
Hamilton Institute, Alex.

Instruments, Measuring, Testing and Recording
General Electric Co.
Westinghouse Elec. & Mfg. Co.
Weston Elec. Instrument Co.

Insulating Cloth, Paper and Tape
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation (See also Paints)
Anderson Mfg. Co., A. & J. M.
Electric Ry. Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Mitchell-Rand Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Insulators (See also Line Material)
Anderson Mfg. Co., A. & J. M.
Drew Electric & Mfg. Co.
Electric Railway Equipment Co.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Insulator Pins
Electric Service Supplies Co.
Hubbard & Co.

Jacks (See also Cranes, Hoists and Lifts)
Brill Co., The J. G.
Buckeye Jack Mfg. Co.
Columbia M. W. & M. I. Co.

Joints, Rail
Zelnicker Supply Company, Inc., Walter A.

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.

Lamp Guards and Fixtures
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Arc and Incandescent (See also Headlights)
Anderson Mfg. Co., A. & J. M.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Signal and Marker
Ohio Brass Co.

Lathe Attachments
Williams & Co., J. H.

Lathes, Car Wheel
Niles-Bement-Pond Co.

Lightning Protection
Anderson Mfg. Co., A. & J. M.
Electric Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Westinghouse Elec. & Mfg. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Anderson Mfg. Co., A. & J. M.
Archbold-Brady Co.
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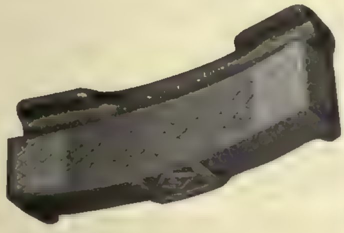

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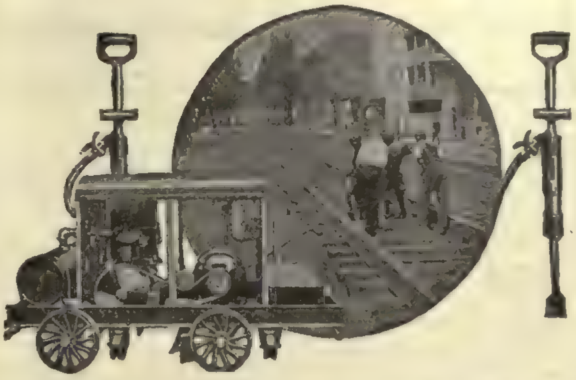

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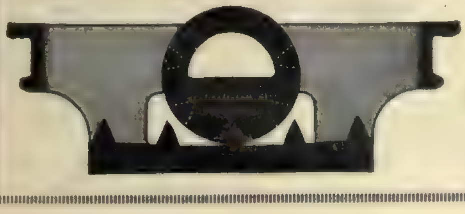

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- Nachod Signal Co., Inc.
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Steps, Safety
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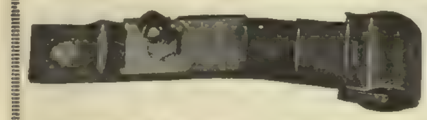

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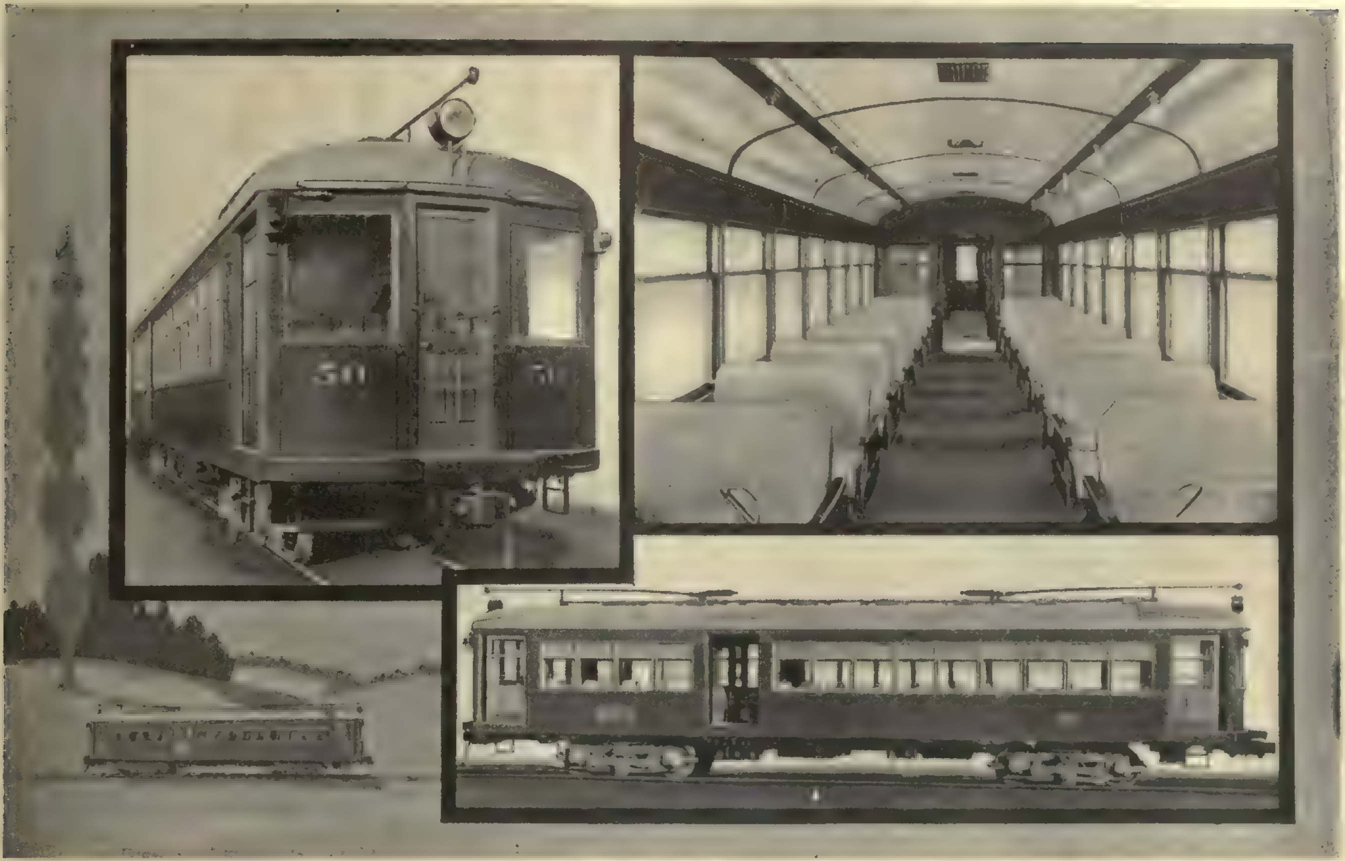

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